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DISRAELI KOBAK, M.D., Editor
Suite 716 — 30 North Michigan Avenue, Chicago, Illinois

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Volume XVI, No. 2

ORIGINAL ARTICLES

EDITORIALS

SPECIAL SECTION

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INTERNATIONAL ABSTRACTS

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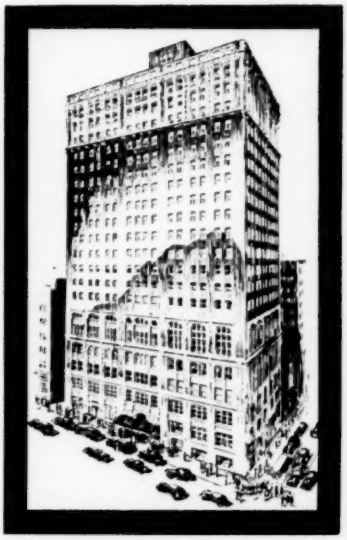

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* * * *

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* * * *

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Group conferences and demonstrations will be held dealing with Fractures, Electrosurgery, Fever Therapy, Short and Ultrashort Wave Therapy, Light Therapy, Massage, Radium and X-Ray Therapy and Exercise.

* * * *

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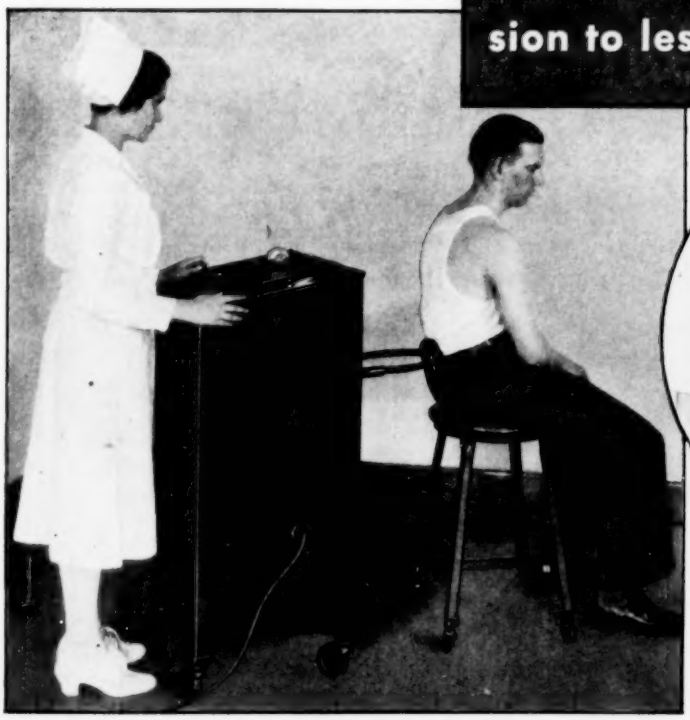

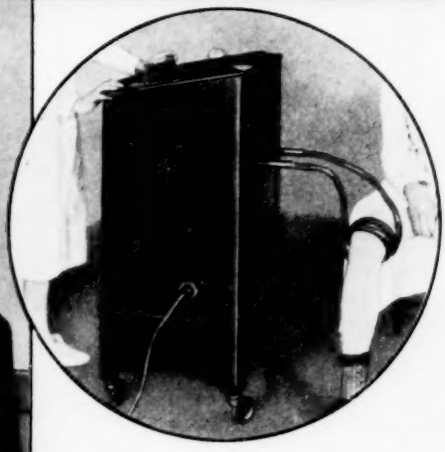

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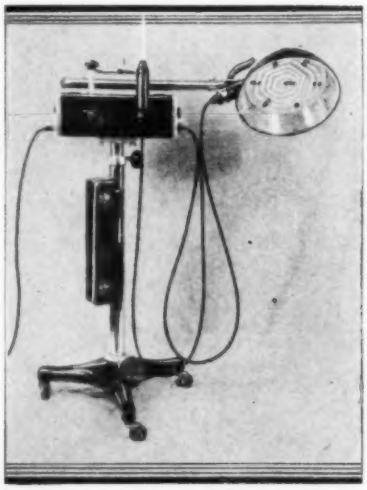

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PRACTICAL AND EXPERIMENTAL USES OF FLUORESCENCE IN MEDICINE *

CHARLES J. SUTRO, M.D. *

AND

MICHAEL S. BURMAN, M.D.

NEW YORK

From the Laboratory Division, Hospital for Joint Diseases

In practical medical fields as clinical dermatology, ophthalmology or otolaryngology fluorescence aids in the recognition of early skin and mucous membrane lesions often not seen with natural light (especially those associated with the formation of scale or pigment). Thus, for example, the routine inspection by filtered ultraviolet radiation of the skin and scalp of a group of children in whom ringworm is suspected will aid in the recognition and isolation of new cases. Fluorescence is of help to the bacteriologist (in conjunction with the dermatologist) in selecting skin lesions from which material can be obtained for diagnostic purposes.[1]

Demonstration of anatomical preparations with filtered ultraviolet radiation has been very instructive. It has been noted that the gross examination of any tissue by filtered ultraviolet radiation evokes fluorescent color reactions which probably depend on the chemical constituents of that tissue.[2] The irradiation of an opened normal knee joint from a child (post-mortem specimen) will emit several fluorescent colors, namely, yellow for the fat pad, greenish or bluish brown for the synovial membrane, and light blue for the articular cartilage.

It has been shown that specimens of pathologic tissue* which appear uniform both to palpation and to unaided vision may under filtered ultraviolet radiation show a variegated appearance.[3] The microscopic examination similarly shows different histologic pictures in the various fluorescent portions of the pathologic specimen. The following cases are cited to demonstrate the usefulness of examining tissue with ultraviolet radiation. A surgically removed tumor of the breast appeared uniformly white in natural light. Under filtered ultraviolet radiation the tumor presented two segments, the upper — hazy blue, and the lower — white. The upper portion was a medullary carcinoma and the lower portion — scirrhous in character. In another breast, a small tumor nodule in the fat which under natural light looked much like ordinary fat, was distinctly outlined as a bluish-purple nodule under irradiation. This method of examination aids the pathologist, especially in the selection of appropriate areas of tissue for frozen section work.

By means of a Kromayer water-cooled lamp (covered with sterile towels) the surgeon can examine the operative field with filtered ultraviolet radiation.* The tissues fluoresce in colors and are earily differentiated.[4] Small invisible nodules are readily recognized on irradiation. This method of examination is best suited in operative procedures where a tourniquet can be applied or where the operative field can be kept free from excess amounts of blood. The presence of hemoglobin prevents fluorescence of the underlying tissues.

Summaries of the examinations of the following operative cases are cited:

Case Reports

CASE 1. — Operation: Arthrotomy of the knee for a torn medial semilunar cartilage (tourniquet applied on the thigh). Under filtered ultraviolet radiation the articular cartilages of the

* Aided by a grant from the Committee on Scientific Research of the American Medical Association, also by a grant from the Emanual Libman Fellowship Fund in memory of Adele Schiff.

* Brown Orthopedic Research Fellow.

* Read at the Thirteenth Annual Session of the American Congress of Physical Therapy, Philadelphia, September 12, 1934.

* Water washed specimens either fresh or fixed in a dilute solution of formaldehyde U. S. P. (1:10) can be used for the examination. A specimen, however, fixed for five or more days in a dilute solution of formaldehyde loses its optimal fluorescent effect; under such circumstances the removal of a thin slice of tissue will restore the maximal fluorescence.

* The nickel oxide filter is cleansed with 95 per cent alcohol. The filter is not considered surgically sterile; the apparatus must be held 10 to 12 inches from the operative field. The examination must be performed in a dark room; one or two minutes should be allowed for eye accommodation. The examination of the exposed operative field usually lasts one to three minutes. It may be repeated as often as necessary, depending on the condition of the patient.

femoral condyles were light blue; the chondro-osseous line was brownish purple; the internal cartilage was white. While no free fluid was detected in the open knee joint by unaided vision, a small amount of fluid was detected in the posterior half of the knee joint by ultraviolet radiation. It is occasionally difficult to obtain a plane of division between the joint fat, the synovial membrane, and the lateral ligaments of the joint. The distinct color reaction of each of these tissues under ultraviolet radiation permits recognition and easy differentiation.

Case 2. — Operation. Open correction for equinovarus deformity (tourniquet applied to the leg). One of the landmarks in the operation, namely, the fat pad near the subastragaloid joint was readily recognized by yellow fluorescence. In addition, the uniform blue fluorescence of the articular cartilage of the head of the astragalus confirmed the normal appearance of the articular surface.

Case 3. — Operation: Exploratory laparotomy. Although carcinoma of the ovary with peritoneal metastases was very evident in the natural light, it was interesting to note that under filtered ultraviolet radiation, the ovarian tumor exhibited purplish areas mingled with numerous yellowish streaks. The metastatic nodules on the peritoneum fluoresced similarly. Microscopic examination of the ovarian tissue and the metastatic nodules revealed areas of marked fatty infiltration (yellow fluorescent streaks in the gross examination). Under natural light the fatty areas in the tumors were not discernible.

Case 4. — Operation: Fusion of the right knee joint of tuberculosis. (Tourniquet applied on the right thigh.) Examination of the open knee joint by filtered ultraviolet radiation revealed the presence of a brownish fluorescence on the anterior half of the tibial articular surface (pannus). The remaining portions of the tibial articular surface fluoresced white due to the existence of articular cartilage. A transverse section of bone removed from the femoral condyles presented a circumscribed defect in the marrow. Under natural light, it was thought to be a tuberculous abscess. On examination by filtered ultraviolet radiation, however, the contents of the cavity fluoresced yellow, indicating the defect to be a large fatty cyst in the marrow.

Cases 5. — Operation: Exploratory laparotomy. The exposed uterine fibroid presented many fluorescent white specks. These minute calcified areas were not seen by natural light. One of the ovaries, in addition, was enlarged and cystic. By ultraviolet radiation, the cystic portion fluoresced deep brown, (hemorrhagic cyst), while the solid area fluoresced a purplish grey color (normal ovarian tissue).

Case 6. — Operation: Removal of enchondroma of the left index finger. The tumor, situated in the marrow cavity was curetted in natural light. Later, under filtered ultraviolet radiation it was seen that the entire tumor was not removed. The unremoved portions of the enchondroma fluoresced a definite greenish blue shade against the whitish blue of the normal cortical bone of the phalanx. The remaining portions of the tumor were curetted under filtered ultraviolet radiation.

Case 7. — Operation: Removal of the fractured head of the radius. The irregular fractured head of the radius and all visible bony fragments in the elbow joint were removed. Under filtered ultraviolet radiation, however, it was seen that several tiny bony fragments were still present in the elbow joint; these were dislodged.

Case 8. — Operation: Ligation of vas deferens. Under filtered ultraviolet radiation, the vas deferens fluoresced bluish white against the golden yellow shade of the fat. The blood vessels fluoresced brown.

Filtered ultraviolet radiation can be used in the examination of the operative field in the orifices of the head, as in the mouth or nose. Abnormal tissue (located superficially) is recognized by the variations in fluorescence.

In experimental medical fields, we have found fluorescence to be of aid in the visualization of the various hollow organs, their ducts and vascular channels.* A dye such as a 2 per cent solution of watery eosin or 1 to 2 per cent solution of medicinal mercurochrome injected either intravenously or into the gall bladder will cause a deep golden yellow visualization of the gall bladder and of the extrahepatic biliary ducts in the opened abdomen of living anesthesized rabbits, when they are exposed to filtered ultraviolet radiation. The gradual excretion of the dye by the small intestine can be followed by the downward progress of the fluorescent mass. Other dyes such as resorcin-sulphonaphthalene and acriflavine also gave good results in the visualization of the gall bladder and extrahepatic biliary ducts. The intravenous injection of a 1 per cent aqueous solution of acriflavine will facilitate visualization of the ureters in the opened abdomen of living anesthesized rabbits exposed to filtered ultraviolet radiation, 20 to 30 minutes after the injection of the dye.[5]

By cooperation with Dr. Ph. Grausman, attending surgeon at our hospital, fluorescent visualization of the extrahepatic biliary duct was performed in two patients in each of whom cholecystectomy was done. After the gall bladder was exposed by a laparotomy, the organ was aspirated. Twenty cc. of a 0.06 per cent solution of acriflavine (prepared by adding 3 cc. of a 2 per cent watery solution of acriflavine to 100 cc. of normal saline and autoclaved) was injected into the gall bladder. The operating room was totally darkened; the

* Organs, ducts, or vascular channels with very thick walls will prevent the fluorescence of the dye in their lumina.

operative field was exposed to filtered ultraviolet radiation (Kromayer lamp). The common duct and second portion of the duodenum were outlined by the golden yellow fluorescence of the dye in the lumen. This was the first clinical application of visualization of the extrahepatic biliary ducts by fluorescence.

The lumina of other tubular organs of living anesthesized rabbits as that of the uterus, the fallopian tubes, the ureters and that of the esophagus were injected with a 2 per cent solution of aqueous eosin. They fluoresced a golden yellow color on irradiation by filtered ultraviolet rays. In dead exsanguinated rabbits, the injection of sufficient amounts of a 1 or 2 per cent solution of watery eosin or mercurochrome into the abdominal aorta emitted under irradiation a fluorescent visualization of the entire arterial tree. The smallest arterioles were clearly seen, as if painted with gold. The veins because of their large content of clotted blood permitted easy differentiation from the arterial system. In living animals the vascular arterial tree of the extremities may be visualized by this method if the arterial and venous circulations to that part are temporarily occluded.[6]

Summary

1. Filtered ultraviolet radiation adds another "visual octave" to our powers of vision. It helps the dermatologist, the surgeon, and the pathologist in detecting small areas of disease which may be imperceptible to the naked eye.

2. The lumina of tubular organs of living animals, as well as the arterial vascular tree in dead animals can be visualized by fluorescent dyes plus irradiation.

3. Visualization of the extrahepatic biliary ducts in two patients in the operating room has been successful.

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Discussion

Dr. Wm. T. Anderson, Jr. (Newark, N. J.): Dr. Sutro and Dr. Burman should be congratulated for their scientific acumen which has led them to the development of fluorescence technic capable of practical application in physiology, in pathology, and in surgery.

When physicians turn to fluorescence, they are applying to their art another one of the physical phenomena. Fluorescence is a very frequent and widely disseminated physical reaction. So many substances exhibit fluorescence that it may be said to be almost as characteristic of a substance as color, taste, and odor.

The nature of the light radiated by the substance during fluorescence is typical of the substance. A careful analysis of this light often provides a positive means for the identification of the substance. Comparison of the fluorescence of a known specimen with another reputed to be the same species may disclose fraud.

The laboratories of many widely diversified arts and trades are using fluorescence in their daily analyses. They are answering many questions such as: Has this olive oil been adulterated? Is this the original masterpiece? Was the amount in this bond altered? Are there any finger prints on this manuscript? It is not surprising that physicians, ever on the alert for a new weapons, should consider the utility of this phenomenon and that progressive scientific men such as Dr. Sutro and Dr. Burman of New York and Dr. Kobak of Chicago are probing and weighing the possibility of utilization of fluorescence in diagnosis and differentiation of tissue. The investigations of these men, and of others who will follow them, will determine the position of fluorescence in medicine.

The world owes a debt to Dr. R. W. Wood of Johns Hopkins who first made a glass that would transmit certain of the ultraviolet rays with the exclusion of visible light. He made possible the detection and observation of fluorescence resulting from ultraviolet irradiation.

The lilies in the field fluoresce gorgeously in the sunlight, but we cannot see that they are shining like so many colored stars because their light is so weak when compared with sunlight that our eyes can see only the sunshine. But, if a lily be selected, covered with a box provided with a window of Dr. Wood's glass and then viewed through a small peep hole in the box, the lily steps forth in all its splendor.

A lily is not appropriate for a gathering of medical specialists, so, we will remove the lily and introduce into the box a uniform greyish mass, a breast tumor. A glance into the box

now shows the tumor in a new design. No longer is it a uniform greyish mass, but colored in yellow, blue, violet and purple. Each of these colored areas differs from its neighbor and a careful microscopic examination will disclose wherein this difference lies.

A darkened room or enclosure is an absolute necessity for the satisfactory observation of fluorescence. Even a moderate amount of daylight can mask completely the very low intensity light of the fluorescence.

Since it is not so convenient to depend on sunshine, artificial light sources are mostly used. Sources rich in ultraviolet rays are especially desirable since these rays appear to be particularly effective for the promotion of fluorescence. Hence the metallic arcs, and especially the quartz mercury arc, have found wide employment in the observation and study of fluorescence. It might be mentioned that discharge tubes are generally not as useful as the arcs because the radiation from the tubes is generally too restricted and monochromatic in character.

Filters which are better than the original filters of Dr. Wood are now available. They are the colored Corex glasses and Ultra glasses developed and manufactured by the Corning Glass Works. These glasses transmit a large portion of the ultraviolet and their use assists greatly the attainment of more brilliant fluorescence.

The findings of Drs. Sutro and Burman reported previously and at this meeting are suggestive that fluorescence may prove as useful in medicine as it has in crime detection, chemical analysis, and other technological pursuits.

Dr. M. J. Dorcas (Cleveland, Ohio): Dr. Sutro mentioned in his summary that this type of apparatus added another octave to our vision. That might be expanded a trifle when we consider that all we know about things, generally speaking, is what we see. We get some impressions from our other senses, but the majority of what we know about things is obtained through our eyes. We get, under appropriate conditions, scientifically controlled information of a definite scientific nature.

We have a condition here where we can approximately double our ability to see things. The presentation today, although far advanced over anything we have had, is just a stepping stone toward far greater achievements in diagnosis and investigation that will follow in years to come.

My experience has been slightly different in some particular details than that described by Dr. Sutro in that I have worked mostly with a slightly different type of light source, a carbon arc. In general, the results are similar. I have found that in ultraviolet, as well as in visible light, most things have colors. In visible light we differentiate between one substance and another because it can reflect different colors, and in the broad, loose analogy in the ultraviolet this fluorescence might be considered to be somewhat similar to the different colors of the ultraviolet. Some things fluoresce differently with different wavelengths, just as objects in different lights reflect differently.

We have not had the opportunity to apply this in medicine, as has been described by Dr. Sutro, but in the laboratory such application can be applied possibly in biological and medical work. It is possible to get a different appearance of things depending on the type of the light source, or the wavelength of the ultraviolet irradiation that falls on the surface of a substance.

The most practical way to do that is to screen the light source, no matter what it is, provided it has the different wavelengths in it. Dr. Anderson said that a monochromatic light source was of less use than the one with a large variety of wavelengths in the ultraviolet. This can be accomplished by the use of a variety of the available ultraviolet transmitting screens. There are several different commercial organizations in the United States and in foreign countries that make a line of these ultraviolet glasses that transmit a variety of wavelengths. By using different screens in the front of the lamp, between the light source and the object to be radiated, we can get, in a broad generalization, different colors of ultraviolet which push this application possibly one step further.

Dr. John A. Huth (Natrona, Penn.): The utilization of filtered ultraviolet light in diagnosis, as Dr. Sutro brought out, is very interesting. However, I am particularly interested in the fact that during the past year certain observers have utilized the fact of fluorescence in the various questions of treatment of diseased conditions. The one in particular that I am concerned with, is the treatment of accessible infections of the staphylococcic and streptococcic type.

I found, in the past year, that if we had taken strips of vaseline gauze, as is commonly found in hospitals for general surgical use, placed them on a table and subjected them to ultraviolet light for a period of 15 to 20 minutes at a distance of about 18 to 20 inches, with a quartz mercury burner, we somehow or other activated that vaseline, so that it carried its bactericidal effect to the tissues upon which it was applied and continued apparently for a definite length of time, producing definite results in these infections.

It was rather striking and surprising to see how quick some of the severe streptococcic infections involving the skin and some of the deeper structures that were accessible, would yield under this continual bombardment of ultraviolet that was given off in these applications. In other words, the vaseline treated by ultraviolet had the property of gradually giving off that bactericidal factor in the destruction of infections.

I was rather struck by the fact that in January, I applied this to my own arm for a streptococcic infection with lymphangitis with very gratifying results. The pain left within four hours after the application. I continued to apply it to my arm for a few days to see what the effect of it would be after the condition was apparently gone, and found that the area covered with the activated vaseline left me a very beautiful sunburn

of the skin, proving to me that the vaseline carried that activity. In other words, it held it long enough to do some good.

We have applied it in burns and have had the most beautiful results in preventing the usual infection of the newly-forming surfaces and the quick elimination of sloughs. I feel that we have many other applications for it.

I have recently been using it in deep infections that have been drained and have been draining for some time, by taking ordinary yellow vaseline, irradiating it, and injecting it with a syringe deep into the sinuses. We saw a very rapid elimination of infections where this preparation come in contact.

Dr. Nathan H. Polmer (New Orleans): More light has been the crying need of the medical eye. Dr. Sutro has very ably and well presented this method of obtaining more light and showing us the information we may get with this light that "shineth in the darkness."

I became interested in fluorescence about five or six years ago when I visited Dr. Herman Goodman, in New York, and saw some of the work that he was doing. We obtained one of these filters and have been more or less playing around with it at intervals. The things we may detect are familiar to all of you, particularly the infected hairs of taenia capitis, the picking out of suspicious, senile keratoses, the examining of chronic x-ray burns. In one case, we were able to pick out, or to diagnose a case of measles about 24 hours before the eruption. We have also used this filtered ultraviolet irradiation in examining a series of cases of acne which had been treated by the x-ray. The roentgenologist, after a certain number of treatments, was afraid to continue for fear that he might have produced some scarring. With this examination in the x-ray darkroom, we showed that there was no scarring as yet.

It is important to know the normal in order to know the abnormal. We have to make further observations to know just what the normal conditions are. In industry and in crime detection ultraviolet fluorescence is a very interesting and fascinating subject.

A point about which I would like to question Dr. Sutro is whether these colored slides, projected on the screen, were actual ultraviolet photographs or whether they were slides artificially tinted in order to bring out the changes which we would see with the eye under the filtered radiation.

Dr. Charles J. Sutro (closing): I want to leave with you an important observation; namely, that when you see a color, for example, yellow, that color should not mean carcinoma, sarcoma, or a benign tumor. The object of this presentation is to show that the differentiation of colors in one tissue is of importance. When a piece of white tissue has a little purple, or brown in it, that means that that tissue is not uniform both in its chemical and histological structure. It means nothing more. The slides were painted with transparent water colors in a darkroom having a small overhead lamp.

ANTERIOR POLIOMYELITIS AND ITS AFTER CARE *

LE ROY W. HUBBARD, M.D.

Director of Extension, Georgia Warm Springs Foundation

WARM SPRINGS, GA.

While the members of this congress are especially interested in the treatment of anterior poliomyelitis, we must nevertheless consider its cause and effect in order to establish a rational plan of treatment. While we have still much to learn about poliomyelitis, certain facts have been generally accepted, even though they may not have been proven with mathematical accuracy.

Anterior poliomyelitis is an acute infectious or communicable disease, which may or may not be followed by paralysis or weakness of one or more muscle groups. Its cause is a specific microorganism which belongs in the class of filterable viruses, i. e., ultramicroscopic in size, which easily pass through an earthenware filter. These viruses are the causes of many diseases common to man and animals, and though they may not have been isolated, their action is fairly well known. The virus of poliomyelitis was discovered in 1910 simultaneously by Landsteiner at the Pasteur Institute, Paris, and Flexner of the Rockefeller Institute, New York City. It is said to enter the body through the nose and throat, travel along the course of the olfactory nerves, and reach the central nervous system, particularly the lower brain and the anterior horns of the gray matter or motor tract of the spinal cord. The organism is discharged from the body in the secretions of the nose and throat, and this constitutes the principal, if not the only source of infection.

The disease is endemic in practically every state in the Union; sporadic cases are occurring all the time, and any community may have an outbreak which will develop into an epidemic. These outbreaks or epidemics occur most frequently in the summer or early fall.

It is believed that there are as many, if not more cases of the non-paralytic type, occurring constantly, than those with definite paralysis or muscle weakness. In the former the virus affects the body generally and does not penetrate deeply the central nervous system. Many of these cases are not recognized and probably, in connection with healthy carriers, are largely responsible for the continuance and spread of the disease.

While it is possible to contract anterior poliomyelitis through infected raw foods and possibly other sources (several milk borne epidemics have been observed and reported), this happens rarely, the principal method of infection being by contact. This may be direct or indirect. Examples of direct contact would be coughing or sneezing of an infected person into the face of another, or the direct transference of an infected object from the throat or nose of one to another. Indirect contact might come from the smearing of the nose or throat discharge on some object which was subsequently handled by a healthy individual, and thence transferred by the hands.

One attack confers immunity, hence second attacks are extremely rare. It has also been discovered that immunity exists among children and adults where there is no history of an attack. This immunity is probably acquired in one of two ways: either by a mild unrecognized attack or a gradually built up immunity, through exposure. It is likely that this, which might be termed natural immunity, is the reason why there are not more cases in epidemics as the exposures are very great. It is thought by some observers that a general immunity is being established in this country which may result in a decline in the number of cases in the future.

Up to the present time, we have no definite means of establishing an artificial, permanent immunity and thus preventing outbreaks, but experiments are being conducted along that line with some hope of success. Also, we have no sure means of preventing paralysis of the muscles after the infection has once entered the body, or of checking its progress.

Importance of Early Treatment

Treatment in the acute, the early convalescent, and the later stages is therefore most

* Read at the Thirteenth Annual Session of the American Congress of Physical Therapy, Philadelphia, September 11, 1934.

important. While it is true that some cases will recover from paralysis, either partially or completely, without any special treatment or in spite of unscientific treatment, there is no doubt that in the majority the end result will depend upon the treatment from the onset.

When the virus has entered the body and traveled along the course of the olfactory nerves it invades the central nervous system and particularly the anterior horns of the gray matter of the spinal cord and the motor nerve roots, and causes an inflammation with resulting edema and swelling around the blood vessels and consequent pressure on the motor cells. This produces loss of function and consequently weakness or paralysis of muscles supplied with motor power by those cells which are situated in the regions of the infected cord. If the inflammation is mild and the pressure moderate and soon relieved, the loss of function may be only temporary, but if atrophy or destruction of the motor cells occurs, the loss of muscle power is greater and more permanent.

The treatment of a case of anterior poliomyelitis has three objectives:

1. To relieve the congestion and edema of the cord and the pressure on the nerve cells as quickly as possible.

2. To keep the muscles in the best possible condition so that, when and if, the nerve function is restored they will be able to function efficiently.

3. To further increase nerve and muscle function by the use of exercises, muscle training, and reëducation.

The first and second objectives are best attained by a fairly long period of absolute rest in bed, and by supporting with some form of suitable apparatus the paralyzed limbs in such positions that the weak muscles are not stretched nor the stronger ones contracted.

In the acute and early convalescent stages rest should be absolute and complete, and the patient should be moved as little and seldom as possible. There is no definite rule by which one can decide how long the rest period should last in an individual case, but it is much better to prolong it beyond what may be absolutely necessary than to begin active treatment one day too soon. An additional reason for this rest period is because, in most cases, there is, in addition to the local loss of muscle function, considerable general nervous shock and prostration. This is particularly noticeable in older children and adults.

Massage may be employed to help the circulation and improve muscle tone, but not until all tenderness of muscles and joints has entirely disappeared. It should be very light in character, for too deep or vigorous massage may destroy the soft and weakened muscle fibres. Use of heat, both local and general, is of value, not only to keep the patient warm, but also to relieve pain and tenderness and improve muscle tone.

I am confident that if the plan which I have so briefly outlined is followed in practically every case, the nerve cells and trunks and the muscles will be in a better condition later to respond to treatment by means of exercises, training, and reëducation than where active treatment is begun too soon. During this rest period of several weeks there is usually a restoration of some nerve and muscle power in some of the groups, and it is advantageous to wait until this has taken place before starting active treatment with exercises.

Exercises

About 1912, the late Robert W. Lovett of Boston, who had for several years made an intensive study of anterior poliomyelitis with his assistant, Miss Wright, devised a system of exercises for muscle restoration and reeducation based on a thorough investigation of muscle function in the various individual groups. This system is quite generally employed by physiotherapists today and, in my opinion, is the most effective, provided the exercises are directed by persons who have been trained in anatomy and muscle function.

In order to know the character and amount of exercise to be given to each set of affected muscles, it is necessary to first make a complete muscle examination with the aid of a chart and a grading of each muscle group. The grades commonly employed are six in number: zero, indicating total paralysis; trace, denoting contraction of muscle fibre without motion; poor, meaning movement without resistance; fair, movement against moderate resistance or gravity; good, movement against strong resistance and normal. Plus and minus signs may be used to indicate power intermediary between the primary grades. These gradings are not mathematically accurate, and two persons with equal training and experience will grade the power in the muscles somewhat

differently, but they will generally be sufficiently accurate for practical purposes.

Reexamination should be made at regular intervals to determine gain or loss of power. The charts are important, not only as guides to the character of the exercises, but as records of the progress of the case, and for the determination when changes in the exercises are advisable.

To be effective in increasing nerve and muscle function, the exercises should not be passive and general, but active and specific. Each muscle group must be exercised separately in accordance with its special function, with the cooperation of the patient, and a definite employment of will power to perform the movement. The objective is not only to activate the muscle fibres but to stimulate the weakened nerve cells, and possibly to excite to action dormant cells and enable them to take up the work of those which are atrophied or destroyed.

The exercises should be given on a smooth, firm surface, using talcum powder to reduce friction, with the patient in a reclining position, relaxed and able to see clearly the part on which the operator is working. There should be no disturbing outside influences. The best results are obtained where there is perfect accord between the patient and operator. Personality is an important factor, and at Warm Springs we frequently found it advisable to change the physiotherapists in order to obtain better cooperation on the part of the patient. Many patients will do better work some days than others, just as a trained athlete will one day make a record performance and a few days later, while apparently in the same physical condition, fall short of his previous effort.

The exercises should be performed very slowly with an appreciable interval between the movements in order to give the patient time to concentrate. It must be remembered that these exercises for weak nerves and muscles are comparably as strenuous as the usual training exercises for normal individuals, and fatigue can produce more damage in the former than the latter. In general, each exercise consists of ten movements, but the last movement should be done as well as the first, and if signs of fatigue appear, the number should be decreased.

About ten years ago Charles Lowman, of Los Angeles, California, began the experiment of having the exercises done in warm water, and established what he termed his under water gymnasium. This was followed three years later by the Georgia Warm Springs Foundation at Warm Springs, Georgia, employing the natural water of the Springs for this purpose. Since that time nearly every institution where the after care treatment of anterior poliomyelitis is carried out has added a pool, tank, or special form of tub to its equipment.

It was found out that the exercises can be performed easier in water an account of the elimination of friction and gravity, with less fatigue, and for a longer time than on the tables, and also that special methods of exercise can be done only in water. Patients appear to enjoy under water exercises more than above water and hence a psychological factor is added which is of great value especially among the older patients. Nerve and muscle development, training, and reëducation by means of exercises is a long, slow process, requiring painstaking cooperation and effort on the part of both patient and operator; but the results obtained in the majority of cases are quite worth while.

The question is frequently asked, for how long may improvement be expected, and how long should treatment by exercises be continued? A general answer to those questions is impossible. The statement that no improvement may be expected after two years from the onset, and active treatment might as well be abandoned, has been proven many times to be untrue; and, as a result of a rather long experience in observing a large number of patients, I am convinced that there is no absolute time limit for improvement if treatment can be carried on. Unfortunately, in many cases, financial and other circumstances will not permit this, and we have to be content with less than we hoped for and could reasonably expect were the conditions different.

For long standing cases, where there is not much hope of actually increasing muscle power, much can be done to train the muscles to work to better advantage. They can be taught to walk better and more easily, to climb steps, get into and out of chairs without assistance, and to do many other things which they have thought impossible.

While there probably always will be a few cases in which the destruction of nerve cells is so severe and extensive as to prevent any hope of much muscle function and they will

remain very helpless, fortunately the percentage is small, and I am convinced that 90 per cent or more of those who can have long and skilful treatment will recover sufficiently to be able to lead useful and happy lives.

Summary

1. Anterior poliomyelitis is an acute infectious or communicable disease caused by a specific filtrable virus.

2. This virus attacks the motor cells of the central nervous system and the result, in a large percentage of cases, is paralysis or weakness of one or more muscle groups.

3. In the majority of cases the end result will depend upon the treatment.

4. In the acute and early convalescent stage absolute rest is most important.

5. In the later stages restoration of muscle and nerve function is obtained best by means of specially directed exercises for each muscle group affected.

6. These exercises can be done most effectively with less fatigue in warm water.

NOTE. Moving picture films showing every detail of the under water exercises performed at the author's institution were presented at the meeting. — EDITOR.

Discussion

Dr. K. G. Hansson (New York): Dr. Hubbard has given us a terse but comprehensive outline of our present knowledge of anterior poliomyelitis and its treatment. I can add very little to it except to emphasize that the treatment followed at Warm Springs can be duplicated at most any hospital. I admit that the spirit found at Warm Springs, and for which Dr. Hubbard is responsible, belongs to what has been called the art of medicine. I am glad to testify here to Dr. Hubbard's unsurpassed knowledge of human nature and his knowledge of poliomyelitis patients.

I would like to stress two points in the under water treatment: The first one is that special training is necessary for technicians employed for the treatment after poliomyelitis. They must have enough knowledge of anatomy and kinesiology to do a clinical muscle and nerve test. This is the follow-up on the result of the treatment.

One can not take a physical education student, an electrotherapist, or a nurse and expect her to give under water treatment creditably. They must be specially trained under supervision.

The second point is the close observation of the individual patient. Ten patients might have paralysis of an upper extremity but various muscle groups might be involved and the exercises, therefore, must vary. If we closely observe patients undergoing under water treatments, we will find that they go stale physically and mentally. They become overtrained and must be given a rest at certain intervals. (Illustration by stereopticon.)

Dr. Howard Moore (Philadelphia): We are very fortunate in having heard Dr. Hubbard whose experience in chronic poliomyelitis is extensive; whose opportunity of observing the effect of the kinotherapeutic bath has been greater than that which falls to the lot of most of us.

The value of electrotherapy is still disputed. I believe the use of deep roentgen ray therapy in the acute stage is advisable. It shortens the period of hyperesthesia — that period of tedious waiting in which "masterful" inactivity is so important; that period in which the physician is beseeched by the family and friends to do something; that period in which the cultist often inserts himself because the impression is gained by the relative that the physician is doing nothing.

The shortening of the acute stages allows earlier active treatment. To the methods mentioned by Dr. Hubbard, diathermy might be added as an early therapeutic measure in an effort to more rapidly lessen the degree of congestion in the anterior horns. It has been my experience, and that of most of my colleagues, that neither diathermy nor any other form of electricity is useful in the chronic stage of poliomyelitis, except that in muscles in which there is no reaction of degeneration anything which will cause the muscle to contract will act as an exercise for that muscle.

Braces are used to a lesser extent than formerly. It is not logical to apply a brace to prevent deformity if other methods of treatment are persevered in. If massage and passive motion, added to exercise and reëducation, will not prevent deformity, certainly a brace will not. Braces are used, however, to enable a patient who cannot walk, or to enable a patient who can walk to walk better. Generally speaking, the more intelligently, the more persistently physical therapy is used the indications for the use of apparatus grow less.

Dr. LeRoy Watkins Hubbard (closing): I purposely did not say anything about electricity in the treatment because this was a special paper on the value of exercises and particularly the exercises under water. I am sure that all of you who have an opportunity to try these exercises for a considerable period of time will believe that it is the most effective way.

I had a long experience in New York State in the treatment of infantile paralysis in the ordinary way with the exercises on the table. I did get excellent results. I had an opportunity for four years to compare the difference between the table exercises and the under-water exercises, and I am strongly convinced that if the under-water exercises can be carried out with the proper technic, and, if you have the proper assistants, you will get better and quicker results.

Of course, another advantage in doing it this way is that you have the mental stimulation coming from a number of people working toward the same end. These patients enjoy it rather than consider it a bore.

MOOT ASPECTS OF SHORT AND ULTRASHORT WAVE THERAPY

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The short wave of today in its medical application, while not a new discovery is in a great measure still unexplored. It seems unfortunate that commercialization of a new modality often precedes its thorough scientific comprehension. Much of the present short wave investigation is open to more than reasonable doubt and conjecture. The very properties of the waves themselves are unexplored, even to the physicists; and while the object of this paper is to generally outline some of the moot questions, my own original investigations will show the issues involved.

To understand the properties of short waves, it is necessary to know something about their origin and physical characteristics. It is for this reason that I believe it best to go over the high points in the development of these frequencies.

Development of Short Waves

About the middle of the 19th century, Clerk Maxwell showed mathematically the relationship of light and electromagnetism. This was of extreme importance, because the stepping stone to the modern use of high frequencies in wireless and broadcasting hinged upon this theory. If this mathematical relationship were true, then electromagnetic rays could be sent into space in a fashion similar to light rays; and the emission of magnetic radiations into space became the basis of radio transmission.

In 1888, Hertz, working with an induction coil and a loop of wire, was able to make the electromagnetic radiations from the induction coil spark across a gap into the wire loop held in his hand. The remarkable part in this experiment was that the loop was held at some distance from the induction coil. This was the first time that electromagnetic radiations from a sending apparatus, namely the induction coil, were picked up by a receiving apparatus; namely, the loop of wire with the gap, using the air as a connecting medium. In fact this was the first wireless transmission. These waves became henceforth known as Hertzian waves. Hertzian waves and radio waves are interchangeable words for the same phenomenon.

In 1901, Marconi successfully repeated Hertz' experiment with the induction coil and wire loop; but in receiving electromagnetic radiation from a huge sparking coil set up in Cornwall, England, he had them first span the ocean to a receiving mechanism in Newfoundland. The letter "S" was transmitted, and its reception concluded the first successful wireless broadcast across the ocean.

Branly, Alexanderson, Dunwoody, Tesla, Edison, Fleming, De Forest, and others further advanced this work.

With the wireless came the radio, and with the radio came a group of amateur radio enthusiasts called "hams," who began to build their own radio sending stations. It was great fun until the air became filled with waves sent out by the commercial wireless stations, the commercial radio broadcasting stations, and the many amateurs. There resulted, because of this indiscriminate wireless sending, much interference, difficulty of reception, and finally the intervention of the United States government. This chaotic situation was easily remedied by allotting certain bands of frequency to respective wireless sending stations. The wavelengths used in wireless sending range from 30,000 meter wavelengths to approximately five meter wavelengths and slightly below. Because, in the beginning, the higher wavelengths were first known and used and because the amateur "ham" radio enthusiasts had to be placated in some way, they were given relatively unknown, lower wavelengths. This meant that the "hams" had to experiment in the then unknown lower wavelength fields. Thus the radio amateurs were the pioneers in the development of the then unknown higher frequencies, 20 meters being designated as short waves and below ten meters as ultrashort waves.

Wavelength and Frequency

To determine the frequency of a wave, its length in meters is divided into 300 million

meters, which is the equivalent of 186,000 miles per second — the velocity of light. Thus a ten meter wave has a frequency of 30 million cycles per second and a one meter wave would have the frequency of 300 million cycles per second. The lower the wavelength becomes, the more rapid is its frequency of oscillation; and when the wavelength has shrunk to that of 0.02 centimeters, we speak of it as an infra-red ray.

It must be apparent that radio waves are the longest waves in the ether spectrum and that a 10 meter wave, although called an ultrashort wave is an ultrashort wave only in comparison to a 1000 meter or longer wavelength. But since the 10 meter ultrashort wave belongs in the long wavelength part of the spectrum, we find that when the wavelength really becomes relatively short, as for example, that wavelength seen by the eye as red, its frequency of oscillations has already mounted to 400 million million cycles per second.

To repeat, an ultrashort wave of 10 meters, having a frequency of 30 million cycles per second is, in comparison to the wavelength of 0.004 millimeters, seen by the eye as red and having a frequency of 400 million million cycles per second, in reality, a very long wavelength. It is ultrashort only in comparison with the very long radio wavelengths.

When the frequencies are increased to 750 million million cycles per second, violet is perceived by the eye. The wavelength of the visible spectrum varies from about 0.00002 to 0.00008 centimeters. As the wavelengths become still smaller, they are designated as ultraviolet. Still smaller wavelengths in the spectrum are the x-rays, next the gamma rays given off by radium, and then the smallest wavelength — the cosmic ray.

The extreme minuteness of the wavelength of the gamma rays for instance, is exemplified by 0.195×10^{-8} centimeters. Therefore we see that the so-called short and ultrashort waves are, in reality long, when compared with the visible spectrum and immeasurably long in comparison with the x-rays and gamma rays occupying the upper regions of the ether spectrum.

For a moment of digression, it is interesting to note that the eye is a radio receiving apparatus which is tuned to a band of high frequencies between 400 and 750 million kilocycles per second. Between these frequencies, the physiologic reaction of the eye is to see the gamut of colors from red to violet. The eye does not respond to and hence no colors are designated for frequencies either below or above this range.

Tesla, in 1891, suggested high frequency waves for therapeutic purposes. His idea at that time, however, was not utilization of the short or ultrashort radiations.

D'Arsonval, in 1891, experimented with high frequencies for medical purposes.

Hegstenberg, in 1900, used high frequency waves in various sterilization experiments.

In 1911, Collins, using short waves, was able to awaken a sleeping cat, showing that the electromagnetic radiations, although having no physical contact with the cat, were nevertheless exerting some physiological effect.

Esau and Schliephake contributed substantially to this research since 1926.

In December 1927, it was found that workmen testing radio equipment had a rise of temperature. This temperature rise was found to result from the radio frequency field surrounding the sending apparatus. This chiefly led to experiments on rises in body temperature, using wavelengths between 25 and 50 meters. The so-called "fever" apparatus was used specifically for its heating effect and the physiologic rise in temperature became the weapon to combat certain pathologic disorders.

In America, some work has been done on the short wave, but relatively little with the ultrashort wave. It must not be forgotten that diathermy is also a high frequency wave with its main field of usefulness approximately in the 200-500 meter range. The spectacular difference between the short waves and diathermy consists in the fact that the short waves can be used in acute and subacute infections which are contraindicated to diathermy because of the danger of recrudesences and exacerbations.

Moot Questions

From this point on we come into a field of debate and doubt. The first question is, do short waves penetrate into the depths of the body? The answer is "yes." The depth of penetration of the wave depends upon two factors, — the length of the wave and the conductivity of the body. In physics, it is a well known fact that the higher the frequency, the

more it tends to travel upon the surfaces of the conducting body. It is for this reason, that in sending apparatus, where high frequencies are used, hollow copper tubing is employed instead of wire to conduct these frequencies, since they are conducted upon the surface of the copper tubing. And even if solid copper were used, the frequencies still would travel upon the surface. This is such a well known manifestation, that I offer no proof except standard text books of physics.

We must therefore, ask ourselves why these frequencies should act differently when a human body is the conducting mechanism? The answer is difficult to understand without some knowledge of physics. In the body, there are three phenomena present when a high frequency current attempts to pass through. There is present resistance, a condenser action or capacitance, and an induction phenomenon.

If we disregard the feature of resistance and view the induction and capacitance phenomena, we find that, in the body, there is practically no induction and a relatively high capacitance. As stated above, these terms mean nothing unless one is acquainted with their electrical significance; but for the following explanation the above electrical phenomena must be presented briefly.

Our next fact is that a condenser with a definite capacitance will more readily pass high frequency oscillations of lower than of higher wavelengths.

Since the induction phenomenon is practically absent in the body, it can be ignored. Therefore, because of this capacitance action of the body, wavelengths of higher frequencies, for example five or six meters, will penetrate more deeply than wavelengths of lower frequencies, for example 15 or 20 meters. The above explanation does not take into consideration many other important facts associated with the penetration of high frequency currents, but to show the complications that might arise because of the shielding action of tissue surrounding hollow cavities in the body, I present the following experiment.

Using a 10 meter wave, we find that a neon bulb will light when placed in the condenser field. If a hollow glass is placed in this condenser field and the neon bulb put into the glass, we find that it lights, showing that the 10 meter wave penetrates the glass. If we now insert into this glass another of smaller diameter so that a small space of ⅛ of an inch separates the surface of one glass from the other, and put the neon bulb into the second glass, we find that it still lights, showing the wave to be penetrating through both glasses. We now fill this space between the surfaces of the two glasses ⅛ of an inch wide, with water containing a pinch of salt. We next insert the bulb into the second glass and find that it does not light. It is apparent that the wave is not penetrating, and since this wall of water ⅛ of an inch thick is the only cause, it must have absorbed the wave within itself. This action is similar to that of playing a radio behind a tall, steel building and finding that certain radio stations will not come in, due to the shielding effects of the steel building. The thin wall of water acts in this way as a shield for the neon tube, preventing the short waves from reaching it.

Clinical Experiences

Comparable to the above experiment we might consider the passage of high frequency oscillations through the nasal sinuses. Here we will find that the shielding action of the walls of the sinuses will prevent the passage of the high frequency current through the sinus cavities. Therapeutically however, we will get a heating action upon the sinus walls. The advantage of using waves of different lengths consists therefore, in their different penetrative ability and their selectivity upon the different tissues in the body. This selectivity of the wave for the tissue depends upon the length of the wave used and the dielectric constant of the tissue. In the body, because different organs have different dielectric constants and consequently different shielding actions, we can see at once that effects deep within the body depend upon many diverse and complicated factors. At present, it is impossible to accurately heat at will any definite depth or organ of the body. We simply do not know enough about it.

The customary mode of giving a short wave treatment, at present, is to place the patient between two insulated metal plates. Between these two plates is a high frequency field of a certain wavelength which can be measured. Now, it must not be thought that between these two plates we have a wave similar to a radio wave. That is entirely erroneous. However, between the plates, there does exist an

electrostatic field of a definite frequency. The characteristic of this electrostatic field is that parallel lines of force perpendicular to each plate are constantly traversing the field. By placing a body within this field, the electrostatic lines of force will naturally act upon the body as a conductor. The heating effect upon the body depends upon the number of lines of force per square centimeter penetrating in that space.

A body placed anywhere in the field at once distorts it. The distortion accounts for the number of electrostatic lines of force in a given area. It is for this reason that the heating effect will be greater if a body is placed nearer a plate than if placed in the center of the high frequency field.

Thus we see that while a high frequency field can be mathematically figured out as to its strength, its distortion caused by placing a body within it, becomes a baffling phenomenon.

The next question is, do short waves and ultrashort waves have definite bactericidal action? According to foreign reports the higher the frequency, the greater the bactericidal action and, in fact, ultrashort waves have for every wave, a specific action on different bacteria. I have duplicated with staphylococcus aureus, streptococcus, typhoid, and other bacteria some of the experiments done abroad, in which I have subjected cultures in a water-bath to the effects of ultrashort waves. The durations of exposures have been from 15 to 60 minutes, repeated as often as three times. The cultures were placed in the water bath and the temperature kept constant at about 36 degrees centigrade. The bacteria were definitely not killed.

The experimental work cited above is but a very small fraction of what has been done in investigating these problems, and these will be published separately under their respective headings. In quoting these researches, I simply wish to bring attention to the fact that much that is being claimed for short waves at present is subject to further investigation. The type of apparatus used in my experiments is, I believe, unique among short wave apparatus of today. It has a power output of approximately 200 to 300 watts, which means a rather strong condenser field. The wavelength can be changed at will from four meters up to 30 meters and the regulation of the meter is so fine as to give, with accuracy, wavelengths in fractions.

Clinically, I have had excellent results in a wide variety of cases ranging from chronic hyperplastic osteo-arthritis to chronic sinus infections. I cannot explain the good results other than by the absorptive and particularly penetrating effect of the short waves. It is entirely possible that the primary action of the short waves may produce eddy currents and induced frequencies in the body which theoretically might not only conduct the temperature into the depths, but in a rather far fetched way, also have some bactericidal action. Clinically, I am much in accord with recorded results. However these results, I believe, must at present at least, be assumed to be due to heat effects.

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ULTRAVIOLET THERAPY OF GONOCOCCAL CERVICITIS *

(A Preliminary Report)

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Among the various physical therapeutic measures that have come into vogue in the last few years for the treatment of gynecological conditions, one of the most recent and least investigated thus far, has been the use of the ultraviolet ray in the treatment of cervicitis, and particularly in the treatment of gonococcal cervicitis.

This investigation was undertaken on the grounds that although much work has been done on the pathology and pathological anatomy of gonococcal infection in the female, there has been very little done on the clinical treatment of this condition, with the result that our present treatment of this disease in the female is wholly inadequate and generally unsatisfactory.

Although this investigation has not as yet yielded any startling results, we hope that it may aid in stimulating interest in this direction. We also feel that while our treatment of this condition has been encouraging, better results will be obtained in our subsequent work with the utilization of certain modifications in technic that will be suggested.

A survey of the literature shows that although much work has been done with electrocoagulation, diathermy and the copper ionization of chronic cervicitis, there has been practically nothing reported within recent years on the use of ultraviolet. Light emitted by the "cold" mercury arc burner has been used as therapy in a large number of conditions, and the accumulated literature is impressive, but despite this its use in the treatment of the above condition has scarcely been mentioned.

Van de Velde[1] states that he has obtained his best results with the ultraviolet in the treatment of rather superficial, easily accessible lesions, particularly in the form of chronic inflammations. He has found that non-malignant erosions of the cervix that do not yield to other forms of medicinal therapy, heal readily following the use of ultraviolet. He warns that the rest of the vagina should be protected to prevent burns. Van de Velde also cites good results with the use of this therapy in such conditions as tuberculosis of the cervix, ulcers on a prolapsed cervix, and in certain types of eczematous lesions of the labia, perineum, and mons veneris. However, he does not mention the use of ultraviolet in cases of specific cervicitis.

Engelhorn[2] states that the indications for ultraviolet therapy in gynecology are erosions of the cervix, leukorrhea, decubital ulcers in cases of prolapsed cervix, and vaginitis. He feels that "the effect of ultraviolet upon gonorrhea in the female should be investigated."

Landeker[3] has had good results with the use of this form of therapy in cases of gonococcal urethritis and cervicitis.

Jonas[4] has used the ultraviolet treatment for various gynecologic conditions, but does not mention its use in cases of specific infection.

Kleeman[5] has had his best results with ultraviolet in case of inflammatory adnexal disease, both non-specific and specific. He has also had good results in the treatment of erosions of the cervix and the decubital ulcers of uterine prolapse.

Bremesfeld[6] has treated a series of 150 cases of cervicitis. He observed a marked improvement in all cases that were treated for a sufficient length of time. He used the carbon arc "ultrasonne" lamp, and gave his patients three exposures weekly, each treatment lasting from fifteen to thirty minutes. Davis,[7] in discussing the treatment of cervicitis, quotes the results obtained by Bremesfeld mentioned above. He com-

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ments on the work by saying that "it is apparent that this is a very slow and expensive way of securing results which are more easily obtained by other methods, ... and there is no evidence that the results which may be obtained by this method justify the time and expense of the treatment." It is important to remember that the work by Bremesfeld was done in 1926, and that since that time ultraviolet lamps have been improved to such an extent that treatments with them are neither costly nor time consuming.

Flaskamp[8] after treating a series of cases states, that he has had good results with the ultraviolet ray in inflammatory diseases of the vagina. He feels however, that treatment by medicaments should not be neglected. He has also treated erosions of the cervix "very successfully" with the ultraviolet.

Behneman[9] has treated a series of 40 patients with erosions and cervical discharge by this method. The frequency of his treatment depended on the extent of the affection and averaged from every other day to seven days between irradiations. Patients were treated with the orificial applicator for an average of three minutes. Behneman states that there was universal improvement after an average number of six treatments. He further states that the treatment is now used by him routinely where other lesions do not demand surgery or radium. He does not state, however, whether or not the cases treated were gonococcal in origin.

Negley,[10] in a report on the use of ultraviolet therapy in urology, has treated among other conditions both urethritis and gonococcal cervicitis in the female. He states that cervicitis, either gonococcal or post-gonococcal, is so markedly benefited, that in many cases one may entirely dispense with other forms of treatment. He has found that acute urethritis in the male does not respond well to this treatment, mainly, he feels, because of the trauma incident to the use of the bulky applicator. He concludes by saying that "only by intelligent application and observation of a large number of cases by many workers can the true value of this method be ascertained."

Technic

A series of 50 cases of gonococcal cervicitis was treated with the ultraviolet ray. These patients when first seen showed in practically every case a profuse purulent cervical discharge with marked erosion and eversion of the lips of the cervix. There was also present in most cases an associated urethritis, and three cases presented a bilateral bartholinitis. The majority of the cases were recent infections, not more than six weeks old. A few had been treated previously by the routine method for a short while with no appreciable response. These patients were told not to take douches during the course of the treatment, so that we could be the more certain of the amount of discharge present, and note in this way whether or not improvement resulted from treatment.

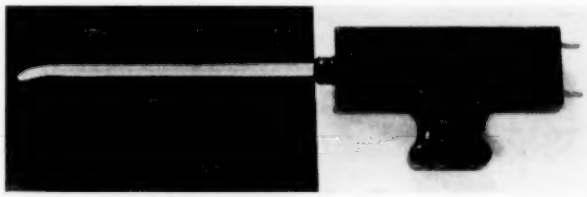

Fig. 1. — Orificial quartz applicator appropriate for local intracervical ultraviolet irradiation.

The vagina and cervical canal were swabbed clean with cotton. Because of our very unsatisfactory experience in attempting to dissolve the thick tenacious cervical mucus by the use of either Dobell's solution or hydrogen peroxide, we changed to the use of the vegetable digestive ferment derived from the plant, Carica papaya. A cotton applicator is placed in this powder and is then carried to the cervical canal. Within 20 to 40 seconds the mucus plug has been entirely digested and liquefied and the cervical canal is clean and may be treated properly. Following this cleansing the

cervical canal and any erosions were painted with ten per cent silver nitrate. The orificial applicator was then inserted into the canal to the internal os and treatment given. All cases were started with a one and one-half minute exposure. The length of time of the exposures was rapidly increased to ten minutes with no ill effects. It was found, however, that an exposure of three minutes was just as effective clinically as the longer treatments, and because of the time involved, treatments of a maximum of three minutes only were given. With few exceptions, after four or five treatments the cervical smears rapidly became negative with no subsequent positive findings. The amount and character of the discharge rapidly changed from the profuse purulent type to normal. Following the development of a normal discharge the patients were put on rests from treatment up to three months. Upon returning for a checkup preliminary to discharge, all cases showed a normal cervical secretion, at least three negative smears, and no clinically suspicious findings.

It was found that in cases showing a marked and extensive erosion of the cervix, the effect of the ultraviolet was not as rapid in curing the erosion as in stopping the discharge. In our attempt to heal the erosion as rapidly as possible, cases not healing after several ultraviolet treatments were cauterized with the electric cautery. The results of this treatment not being entirely satisfactory, we changed and used both the Kimble-Jaros and Cherry technics of cervical coagulation. The results with these methods were eminently more satisfactory than with the previous technic. An insufficient number of such coagulation treatments have been given, however, to warrant any definite conclusions either as to effectiveness or preference of technic. In every case of the small series cited the end result was a healing of the lesion. Patients in this series were treated twice weekly with the ultraviolet ray and the average number of treatments given was twenty. There were noted no ill effects from the treatment, although two of the cases had a small amount of bleeding each time following the removal of the applicator. Four cases also complained of uterine cramps at various times during the treatment, but these findings were not constant and did not affect the results.

For the sake of comparison I have reviewed the charts of seventy patients who had been on the usual routine treatment. It was found that the average case was treated twice weekly, and that the average length of time that these patients were under treatment was eighteen months. It can thus be readily seen that our results with the ultraviolet ray have been much better not alone from the standpoint of the patient herself but also from the standpoint of economy.

I cannot agree with Negley that ultraviolet treatment alone will cure all cases of erosion and discharge, but I do feel that used in conjunction with other physiotherapeutic methods the ultraviolet ray is an extremely valuable addition to our gynecologic armamentarium.

Summary

1. As a preliminary investigation a series of 50 cases of gonococcal cervicitis were treated locally with the ultraviolet ray.

2. Coagulation of erosions by the Kimble-Jaros or Cherry technics was used as adjuvant treatment in 8 cases.

3. Patients were treated twice weekly for an average number of twenty treatments.

4. The cases treated showed uniformly good results and the development of no complications.

5. An interesting observation made was that the more recent the infection the more rapid the cure. Chronic cases invariably take longer to cure by this method.

6. The vegetable digestive ferment derived from the plant Carica papaya which acts in either an acid, alkaline, or neutral medium, is extremely effective in cleansing the cervical canal of any tenacious mucus plug, preliminary to treatment.

7. It is suggested that in cases of gonococcal cervicitis treatment be given locally with the ultraviolet ray at least every other day, averaging three minutes per treatment. It is also suggested that persistent erosions be treated by the use of electrocoagulation.

8. Treatment given in this way will be found to be simple, and eminently more ef-

fective than topical application of antiseptic drugs.

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* Note: Thanks are due to Miss Katharine McPherron of the Physiotherapy Department at the Minneapolis General Hospital for her technical assistance.

* Note: The vegetable digestive ferment which was used is manufactured under the trade name of Powdered Caroid.

(Discussions of this article to be published in a future issue. — Editor.)

Calls Food Faddists a Menace to Health

Food faddists — "the vegetarians, the meat eaters, the drinkers of buttermilk, and gnawers of apples" — insult reason and menace health, the meeting of the American Dietetic Association was informed.

Deploring the magnifying of half truths and other devices of "high-powered salesmanship," Dr. Martin E. Rehfuss, professor of clinical medicine at Jefferson Medical College, Philadelphia, said:

"Diet faddists have reached a point where they are a positive menace to the health of the community and an insult to the reasoning of intelligent men and women."

People have become food conscious to a superlative degree, Dr. Rehfuss declared.

Men and women in early stages of tuberculosis, cancer, and other diseases may be found today seeking relief in diet fads, he said, and meanwhile losing valuable time in getting treatment. Many get their diet advice entirely by mail, thus ignoring the first rule in going on a special diet — to have a complete physical and laboratory examination.

Dr. Rehfuss described to the dietitians biological experiments he has conducted which disprove the recent popular suggestion that proteins and carbohydrates should not be eaten at the same meal. Dr. Rehfuss tested the digestibility of these two kinds of food together when eaten by normally healthy people and in addition he tested fifty patients suffering from various diseases.

Chopped beef was used in the tests to represent protein and mashed potatoes to represent carbohydrate. In the sick persons, some suffering from stomach disease, gall bladder trouble, nervous disorders, and other ailments, it took only about three minutes longer for the stomach to digest the beef and potatoes together than the meat alone.

"This explodes the idea that these foods will not digest in the stomach when combined," Dr. Rehfuss pointed out. — *Science News Letter*, November 10, 1934.

RESULTS OF SHORT WAVE AND ULTRASHORT WAVE THERAPY (RADIATHERMY) *

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For several years past short and ultrashort wave apparatus has been advertised. General interest has been aroused by reports of unique results and claims of the utter simplicity and safety of treatment. Very little, however, has been stated about construction, energy input, and maintenance cost. The often enormous difference in watt output and wavelength between the apparatus referred to in the literature and that offered for sale is ignored. Still more important is that the technic, far from being simple, is as intricate as that of deep x-ray therapy. Without proper apparatus and technic, the results at best are indifferent, and neglect is apt to result in severe burns.

Investigations on the physical principles, on the technic, and on the dangers will be dealt with in a separate publication. The following study presents a survey of the clinical experience with this new therapy.

Results of Short Wave and Ultrashort Wave

Table 1 is a compilation of 1144 cases published, from twelve different sources and includes 60 cases of my material. The numbers are incomplete because the table presents only the literature accessible to me in which some of the authors gave no definite numbers of cases and percentage of improvement. The figures themselves are, therefore, only approximate.

The difficulties of evaluation of short wave and ultrashort wave therapy are two-fold. First, are the ones encountered in every new therapy, which is employed in a variety of acute and chronic conditions; secondly, special difficulties inherent in the present status of short wave and ultrashort wave therapy. Due to the short time of observation, the results in chronic diseases should be regarded as tentative. Another weakness in the reports is that relief is often not distinguished from objective improvement. Finally, the first reports are apt to reflect the optimism which is characteristic of the pioneer in any field.

The special difficulty to evaluate the present state of short wave and ultrashort wave therapy is the variety of wavelengths, energy, and the mode of application used. Whether this makes only a quantitative or also a qualitative difference, in other words, whether not only the dosage, but also the medicine we apply in short wave therapy is different, is open for discussion.

With the exception of Pitzen,[12] who used a 15 meter spark-gap machine, and whose 45 cases are included in the table, all others have used tube machines. Schliephake and his followers work with apparatus of 1000 to 3000 watt output ranging from 3 to 30 meter wavelengths and claim that waves from 3 to 6 meters are in most conditions far superior to the longer waves. Only for the treatment of migraine, Schliephake[1] claims the 15 meter wave to be optimum wavelength. Liebesny[9] goes so far as to state that in some conditions the longer waves are contraindicated, as they favor growth of organisms, for instance actynomyces. Stiebock,[2] Thomberg and Groag[3] use an output not exceeding 750 watt, and in most conditions the unipolar application. The first worked with 75-750 watt, 3 to 30 wavelengths, and did not notice striking differences, if the wavelength does not exceed 15 meters. He also used different combinations with stanniol condenser and galvanism and short wave fulguration in neuralgia and naevi. Thomberg and Groag use a range of 4 to 8 meters. I have used 23 meters and 6 meters, 225 watt output. (Tables 2 and 3.)

My material has separate columns for objective and subjective improvement, but has not been observed long enough to justify conclusions as to the duration of remission in chronic cases. It is, therefore, only to be considered as the immediate effect of the treatment, but may be accepted as a sug-

* Read in part before the Pacific Physical Therapy Association, Los Angeles, Oct. 10, 1934.

TABLE 1.—*Résumé of Short and Ultrashort Wave Therapy*

A.—Infectious Diseases

Condition	Authors*	Approx. No. of Cases	Cured or Improved	%	Not Improved	%	Remarks
Furunculosis	1, 2, 3, 4	500	500	100	....	.....	Infectious diseases, exclusive of furuncles and carbuncles
Purl. Derm.	5, 7	.....	.....	.....	....	.....	
Lung and Pleural Infections	1, 2	31	28	90.4	3	9.6	
Osteomyelitis	1, 2, 7	18	18	100	....	.....	
Oral Infection	2, 7, 8	29	26	.....	3	.....	
Infection of Tonsils	1, 2, 7	7 P**	4	57.5	3	42.5	*195 cases*
Otitis Media	2, 7	27	12	44.5	15	55.5	
Female Adnexia	1, 5, 6, 7	48 P**	41	85.5	7	14.5	157 improved or 80%
Chr. Enceph.	3	1	1	.....	....	.....	
Liver and Gall Bladder	2, 8, 9	14	13	92.8	1	7.1	
Pyelitis and Cystitis	7, 9	8	3	27.5	5	67.5	38 unimproved or 20%
Prostatitis	1, 2	12	11 P**	81.7	1	8.3	

B.—Rheumatic Diseases

Neuralgias	2, 7, 9, 10	97	86	88.7	11	11.3	Rheumatic diseases
Myositis	7, 9, 10, 12	35	26	79.4	9	20.6	
Bursitis	2	16	15	14	1	6	*324 cases*
Tenosynovitis	7, 9	4	2	50	2	50	
Non-specific Arthritis	7, 9, 10, 11, 12	146	116	79.5	30	20.5	270 improved or 83.2%
G. C. Arthritis	7, 10	25 P**	24	96	1	4.0	54 unimproved or 16.8%
Coccygodynia	7	1	1	.....	....	.....	

C.—Miscellaneous

Condition	Authors*	Approx. No. of Cases	Cured or Improved	%	Not Improved	%	Remarks
Asthma	9, 10	17	13	76.5	4	23.5	
Chronic Bronchitis	9	3	2	75	1	25	Misc.
Otosclerosis	2, 7	13	7	53.9	6	46.1	Diseases
Buerger's Disease	2, 9	23	20	85	3	15	
Chronic Leg Ulcer	7	1	1	.....	....	.....	*125 cases*
Acroparasth Pernio	7, 10	24	20	95.5	4	4.5	
T. B. Fistulas, Skin and Lung	7	17	17	100	....	.....	103 improved
Actinomycosis	3, 8	3	3	100	....	.....	or 82.5%
Leukemia	3, 7	2	.....	.....	2	100	
Verruca Nevi	2	17	16	94.2	1	5.8	22 unimproved
Migraine	2	3	3 P**	100	....	.....	or 17.5%
Gastritis and Pylorospasm	7, 9	2	1	50	1	50	
Total Number of Cases		1144	1030	89.7	114	10.3	
Minus 500 Furuncles		644	530	82.3	114	17.7	

* See references.
** Partial results.

TABLE 2.—*Results with Short Wave Machine*

(23 meters—7 amp.—110 volts)

Condition	No. Cases	Obj. Imp.	Sub. Imp.	Not. Imp.	Remarks
G. C. Arthritis	2	2	....	0	
Inf. Arthritis	4	2	....	2	
Rheum. Arth.	1	....	....	1	
Occup. Arth.	1	1	....	....	
Spondyl. Ankyl.	1	1	....	....	
Osteoarth. Spine	1	....	1	....	
Osteoarth. Hip	3	1	1	1	
Sacro. Arth.	2	0	1	1	
Mysositis	3	2	....	1	
Gout	1	....	1	....	
Arthralgia	3	....	3	....	
Fistula after Osteomyelitis	1	1	....	....	
Acne	1	1	....	....	
	24	11 (45.4%)	7 (29.1%)	6 (25.5%)	

TABLE 3.—*Results with Ultrashort Wave*

(6 meters, 225 W. output)

Condition	No. Cases	Obj. Imp.	Sub. Imp.	Not. Imp.	Remarks
Inf. Arth.	6	3	....	3	Effusions not improved.
Rheum. Arth.	1	1	....	....	
Ankl. Spine	2	....	1	1	
Osteoarth. Spine	1	....	1	....	
Osteoarthritis	5	3	2	....	
Sacroliilia	1	1	....	....	
Stenosing Ten. Ext.	2	....	....	2	
Sciatica	1	1	....	....	
Arthralgia	4	4	....	....	
Coccygodynia	1	1	....	....	
Abscess	3	2	....	1*	* Discontinued.
Chron. Ulc. Leg	1	1**	....	....	** Still under treatment.
Chronic Sinus	1	....	....	1	
Chron. Otitis Med.	1	....	....	1	
Otosclerosis	1	1	....	....	
Pyorrhea	1	1	....	....	
Inf. Tonsil Stump	1	....	....	1	
Inf. Cervical Gl.	1	1	....	....	
Aleuk. Leukemia	1	....	....	1***	*** Treatment of ulcer of jaw, spleen and long bones.
Pylorospasm	1	....	....	1	
	36	20 (55.5%)	4 (11.2%)	12 (33.3%)	

TABLE 4.—*Summary of Author's Cases*

Condition	No. of Cases	Obj. Imp.	Per Cent	Subj. Imp.	Per Cent	Not Imp.	Per Cent
Arthralgia, Neuralgia, Myositis	12	8	.....	3	.....	1	.....
Non-specific Arthritis	29	13	44.8	7	27.5	9	27.7
G. C. Arth.	2	2	.....	....	.....	....	.....
Gout	1	....	.....	1	.....	....	.....
Stenosing Tenosynovitis	2	....	.....	....	.....	2	.....
All Rheumatic Cond's	46	23	50%	11	21.7%	12	28.3%
Miscellaneous	14	7	50%	....	.....	7	50%
Total of All Cases	60	30	50%	11	18.3%	19	31.7%

gestion, whether the treatment in certain conditions has been successful.

If we analyze the material, with all the reservations, we find the percentage of improvement for the 1144 cases tabulated extremely high, amounting to 897 per cent. We recognize that the 500 cases of furuncles and carbuncles with 100 per cent cures have a preponderating influence on the results. But even if we abstract these 500 cases, there still remain 644 cases, with 530 or 82.3 per cent improvement.

In my own material of 60 cases, 41 were improved, reducing the favorable percentage to 68.3, however, only 30 or 50 per cent of these were objectively and 11 or 18.3 per cent only subjectively improved. We see, therefore, how much the personal equation enters in the estimation of results. Even these figures, as pointed out, give only the results immediately after treatment.

A similar reservation has to be made in comparing the efficiency of the two wavelengths in our cases. Apart from the inequality of the material we used in 24 private patients the 23 meter short wave applications in combination with other treatments, while 36 cases were treated with the 6 meter wave exclusively. If we consider both subjective and objective results, in our 24 cases, 18 or 74.5 per cent showed improvement, while the 6 meter wave achieved in 20 of the 36 patients, or 66.7 per cent, improvement. As regards objective improvement, the exclusive treatment with the 6 meter yielded 55 per cent, as against 45 per cent with the 23 meter, combined with other treatment.

There also are differences in percentage of improvement in the two groups of cases represented in my material. The bulk consists of 46 cases of rheumatic conditions with 34 cases or 71.7 per cent improvement, while the other group of 14 miscellaneous cases showed 7 improvements or 50 per cent.

On account of their prevalence and im-

portance the infective conditions will be discussed first.

Acute Infections

Carbuncles and Furuncles. Of about 500 cases, Schliephake alone reported 300, and Stiebock over 100. The results were uniformly good. The average period of treatment was four or five days. Large carbuncles healed in 10 to 20 days by 8 to 15 treatments. In every case surgical interference was avoided. In most of the cases the pain subsided after the first treatment, and sharp demarcation set in. In cases where suppuration had commenced, the pus was evacuated automatically and the necrotic areas sloughed off rapidly. I had opportunity to treat three abscesses of the hand and foot with 6 meter wavelengths. In two the results were good. One patient discontinued treatment after the first application. The volume of observation and the uniformity of the results speak for the efficiency of the treatment. Both Stiebock and Schliephake remark that their material contained a number of carbuncles of a serious type. Still this result is not sufficient as a basis for a new and elaborate therapy. Its justification must be sought in results in more severe infections that are less amenable to other treatment.

Purulent Infections of Lung and Pleura. Out of 31 cases reported, Schliephake treated 20 cases of empyema, chronic pneumonia with gangrene and abscess of the lung. They were all far advanced cases. All were cured by a treatment lasting from 3 to 6 weeks, with only an occasional pleural puncture. All cases were controlled by x-rays, which showed the gradual disappearance of abscesses. In only two cases, outside of this series, was a rib resection done. Stiebock also reports 10 cases of lobar pneumonia with lung abscess and pleurisy, 8 of which were cured and 2 were not improved. Another failure is reported by Groag and Thomberg treated by the unipolar method.

Osteomyelitis. Schliephake reported 12 cases, two acute cases were cured by 10 treatments, in the chronic cases, elimination of sequestra and healing was promoted. Stiebock had 6 cases of osteomyelitis, 5 of which were cured and one was improved. I have treated a case of osteomyelitis of the right hip of 16 years duration. Three fistulas and several deep abscesses were present for 5 years with no tendency to heal. After 12 applications of the 23 meter wave, two fistulas closed spontaneously, and a chronic abscess healed two weeks after incision.

The number of cases is too small, and the results, although suggestive, cannot be accepted as conclusive.

Foci of Infection

Schliephake emphasizes the efficiency of the ultrashort waves in focal infections and recommends them in tonsillitis, sinus infections, pyorrhea, periostitis of the jaw, granuloma of the teeth, and prostatitis without giving details. Stiebock also mentions 12 cases of infections of the antrum, sinus, and chronic tonsillitis, with good results in some cases, while others had to be operated upon.

Of the 7 cases of tonsillitis tabulated, 6 were treated by Groag and Thomberg. Five recovered quickly, one succumbed to sepsis, which was present at the start of the treatment. I have treated a patient suffering from infected tonsil stumps with polyarthritis. After 12 treatments with the 6 meter wave I have not seen any remarkable improvement in the inflammation of the throat. During the treatment an effusion developed in the right knee, which, until then has not been affected.

In a case of chronic antrum infection I have not seen any improvement after 8 radiations with the 6 meter wave. However, this case was complicated by an obstruction of the nasal passages.

In a case of acute inflammatory swelling of the cervical lymph glands, after five treatments with the 6 meter wave, I have seen marked decrease in size and inflammation.

Stiebock treated 26 cases of otitis media, 12 of which improved. I had a negative result in a chronic case of long standing.

Of 29 cases of oral infection, including pyorrhea, granuloma of the teeth, periostitis of jaws, 18 were treated by Stiebock with uniform good results. Ten cases were under the care of Weinmann and Weissenberg,[8] seven of which improved. The treatment was combined with dental care. I have treated a case of severe pyorrhea, with the 6 meter wave, with some improvement, but the patient discontinued after the fifth treatment. Twelve cases of prostatitis listed were treated by Stiebock with only one failure.

The number of cases of focal infection so treated is still insufficient, and the results are

not sufficiently uniform to establish the value of short wave therapy in focal infections. The most promising thus far, are the results in pyorrhea and other dental conditions.

Abdominal Infections and Diseases

Schliephake emphasized the good results in pelvic and adnexal inflammations and is here supported by Pflomm,[6] Raab[5] and others. The 48 cases tabulated represent only a partial list, 41 of which, or 85.5 per cent, were improved. On the other hand, Stiebock considers these conditions in his list of contraindications, he having seen exacerbations of pelvic inflammation under this treatment.

Of 14 cases of cholecystitis, 13 had good results. Stiebock also reported improvement in 3 out of 4 cases of pyelonephritis, but the Moabit Hospital reported failures in 4 cases of pyelitis and cystitis. In a case of pylorospasm, I did not see any benefit after 10 applications of the 6 meter wave. The Moabit Hospital reports success in a case of chronic gastritis. The experience in abdominal diseases is, therefore, not only limited, but also contradictory.

Circulatory and Other Disorders

Buerger's Disease. Stiebock reported a total of 21 patients, 12 of whom had a mild and 9 a severe type, some complicated by gangrene. Of the 12 mild cases 8 were cured and 4 improved, while of the 9 severe cases, 8 were cured and 1 showed failure. The Moabit Hospital reported failures in two cases treated.

Akroparesthesia and Frostbites. Stiebock reported 22 cases, of which 20 were cured and 2 were improved. I have treated a case of akroparesthesia with marked improvement after three treatments with the 6 meter wave.

Angina Pectoris. Schliephake claims also some good results in the treatment of angina pectoris, myocarditis, and angiospastic conditions.

Chronic Ulcers. I have under treatment a man, 34 years of age, with chronic extensive ulcers with indurated edges of both sides of the ankles, of 16 years duration. After 20 treatments, the ulcers were reduced to less than half their size. In order to achieve complete healing, I have now started to inject the veins with sodium morrhuate. The patient stated that former attempts to obliterate the veins by injections have failed. After the first injection the vein became occluded.

Central Nervous Disorders. Thomberg and Groag report healing of a case of chronic encephalitis by ultrashort wave of the skull. Schliephake and Kauders have treated successfully some cases of progressive paralysis with ultrashort waves, without pyrrhexia. Schliephake and Stiebock each reported success in the treatment of 3 cases of migraine.

Tuberculosis. Stiebock had good results in 11 cases of tuberculosis of the skin, and fistulas. He had also improvement in an advanced case of tuberculosis of the lungs. Schliephake saw promising results, but the number of cases was too small to permit conclusions.

Otosclerosis. Stiebock had good results in 6 out of 12 cases. I treated, with the 6 meter, a man, 75 years of age, suffering from otosclerosis for 15 years. He had improvement in hearing after 10 treatments.

Asthma and Chronic Bronchitis. Of the 17 tabulated cases, 12 were treated at the Rudolf Virchow Hospital[10] with improvement in 10. Of 5 cases treated at the Moabit Hospital, only 3 were benefited. Stiebock treated 3 cases of chronic bronchitis with improvement in 2. I obtained temporary improvement in 2 cases, with a few treatments with 6 meter wave, which are not included in this material.

Rheumatic Diseases

Three hundred and twenty-four cases are tabulated of which 270, or 83.3 per cent, were improved and 54 or 16.7 per cent were not improved. My material contains 46 cases of which 34 or 71.7 per cent, were improved; 23, or 50 per cent, were objectively and 11, or 21.7 per cent, were only subjectively improved. For the different diseases in this group, however, there are marked differences in the percentage of the immediate results, which justify separate analysis.

Neuralgia. In this group I include sciatic, trigeminal, and intercostal neuralgia as well as herpes zoster, of which 96 cases are tabulated with 86, or 88.7 per cent showing improvement. Schliephake did not have uniform results. Stiebock had success in all of his 42 cases, but he used fulguration with the 15 and 4 meter waves, which strictly does not belong to short wave therapy. Pitzen also had good results in 4 cases. Two cases of intercostal neuralgia due to pressure of a deformed spinal column, however, did not improve. He rightly points out that in such me-

chanical etiology the treatment is contraindicated. I had a good result in a case of sciatica with 10 treatments of 6 meter short wave, after failure with other therapy.

Myositis and Arthralgia. Of 35 tabulated cases, 26, or 79.4 per cent, were improved. In 11 cases of my material, which were treated with 23 meter wave, and 5 with 6 meter wave, I observed improvement in 10 cases, or 91 per cent. The results were good with both apparatus. A case of coccygodynia, previously treated with alcohol injections without success, was promptly relieved by three treatments of 6 meter wave. The lowest percentage of improvement (38 per cent) was reported by Pitzen, who treated 7 cases of neuralgia with the 15 meter spark-gap machine.

Bursitis and Tenosynovitis. Of 16 cases of bursitis, Stiebock saw improvement in 15, or 94 per cent. The Moabit Hospital reported improvement in 2 cases of tenosynovitis. I had failures in 2 cases of stenosing tenosynovitis of the extensor tendon of the thumb, treated with the 6 meter apparatus.

Gonococcal Arthritis. Of 25 tabulated cases of gonococcal arthritis, 23 were reported by the Rudolf Virchow Krankenhaus, which were improved. I treated with objective improvement two cases of chronic gonococcal arthritis of the ankles with the 23 meter wave machine. In one case, a small effusion persisted under treatment. Schliephake emphasizes the rapid disappearance of pain and swelling under the treatment. It must be remembered, however, that various other methods of treatment, including hyperpyrexia, have recently been recommended for gonococcal arthritis with equal claims.

Non-specific Arthritis. Authors either do not state the type or they use a different nomenclature, therefore the 146 tabulated cases are not further separated. Of these 116, or 79.5 per cent, were improved. My material contains 29 cases, of which 21 were improved, or 72.4 per cent, these being eminently chronic cases. The figures present immediate results only. Of 13 cases treated with the 23 meter wave 61.6 per cent were improved, but supporting treatments was also given. The group of 16 cases treated with 6 meter wave showed 75 per cent improvement. In the 23 meter group, only 38.4 per cent were improved objectively, in the 6 meter group, 50 per cent were improved objectively, as manifested by decrease in swelling, stiffness, and return of normal range of motion. We did not have an opportunity to compare the effect of the different wavelengths in the same patients, except in two cases, which were first treated with the longer wave and later with the ultrashort wave. In a case of spondylitis deformans, the patient felt greater relief from the 6 meter wave. The other, a case of anklyosing spondylitis, felt better under a longer wave. We have noticed a marked difference of action on different joints in cases of infectious polyarthritis. The small joints, finger, and wrist, responded far better than larger joints. The same observation is reported by Stiebock, who regards the treatment of large joints as contraindicated. I have, however, had good results in the treatment of shoulders and hips and sacroiliac joints for osteo-arthritis. In several cases painless motion was restored after a very few treatments. Schliephake, who has not reached definite conclusions on the results in arthritis, and recommends hyperpyrexia in polyarthritis, claims that the best results are seen in cases with effusion. In 5 cases treated with the 6 meter wave, I did not see any influence on the effusion, even after the fluid was aspirated. It reaccumulated at the same rate as before treatment. In one case the effusion developed in a knee which, until then had not been affected. The poorest results in arthritis were again reported by Pitzen, who treated 31 cases with the 15 meter spark-gap machine and had improvement of subjective symptoms in only 38 per cent, with objective improvement in none. However, he transferred 4 of his cases to Schliephake, who was able, by treatment with a tube machine of 8 meter wave, to cure or improve 3 of these cases. We see, therefore, that the immediate results are contradictory and depend a good deal on the apparatus, and method of application.

Contraindications

Only Stiebock gives definite contraindications on the basis of 67 cases. Some of these, like peritonitis, appendicitis, pelvic inflammations, adnexitis, endometritis and recent gonococcal infections have responded well according to other authors. His statement that the treatment of arthritis of the larger joints is unsuccessful is, according to my experience, limited to infectious polyarthritis with effusion. Stiebock further excluded neurasthenia,

paralysis agitans, multiple sclerosis, and neoplasms from this therapy.

In a case of aleukemic leukemia, with only 2-3 per cent of neutrophiles and with ulcers of the gums and tongue, which I have treated with the 6 meter wave over the jaw, spleen, and long bones, no influence on the ulcers, or on the blood picture was noticed. The patient rapidly declined under the treatment. Groag also treated a case of mild aleukemic leukemia with swelling of the submaxillary glands. Although he reported a definite increase in the neutrophiles, no decrease in the swelling of the submaxillary glands was noticed after 20 treatments. They disappeared after three x-ray irradiations. These 2 cases seem to contraindicate the use of short waves in leukemia.

Conclusions

Although short wave therapy was tried in a wide range of diseases, two groups are predominant in the publications to date. They comprise 1016, or 81.9 per cent of the 1144 cases compiled. Other conditions represent only 125 cases, or 10.9 per cent. In the rheumatic group of 324 cases, or 28.3 per cent, of the total, we have seen that no permanent results have as yet been established; that there is a divergence of percentage of immediate results and a marked difference in the effect of the different types of arthritis and in different joints. While the total of subjective and objective improvement is impressive and shows trial worth while, the treatment cannot as yet be considered superior to other modalities. In the second group, the infectious conditions of pyogenic origin, which includes 695 cases, or 60.1 per cent, of the whole material, the situation is different. Schliephake, whose undefatigable labors have greatly stimulated the development of ultrashort wave therapy claims these diseases as the exclusive field for short and especially ultrashort wave therapy, which cannot be substituted by any other modality. Diathermy is out of the question, as it is known often to aggravate acute and subacute infectious processes.

This view is supported in the first place by the results in furuncles and carbuncles, which form 43.3 per cent of the total. Here around 100 per cent cures are uniformly reported. It is further supported by a group of advanced pyogenic lung and pleural infections and partly also by osteomyelitis. In focal infections and abdominal conditions the results are not nearly so good or uniform. The whole group of these infections contains only 195 cases, or 17.5 per cent of the total material. Schliephake's conception of short wave therapy, as being of equal efficiency with x-ray therapy, stands and falls with its worth in this group of pyogenous infections where alone it could be without competition, as are the x-rays in skin and cancer therapy. It is, therefore, necessary to widen our experiences in this field before we can pass final judgment on this new therapy. Ultrashort wave therapy, carried out by the method and apparatus of Schliephake, is just as costly and as complicated as x-ray therapy. It is only justified by indisputable results, which cannot be paralleled by simpler or less expensive modalities.

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THE FLASHER SINUSOIDAL MACHINE

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In this machine a simple combination of vacuum tubes, transformers, and one or more thermal operated sign flashers completely replaces the motors, vibrators and alternators usually found in outfits designed to furnish the same so-called "low volt" currents.

The first machine was built in December, 1926, as an emergency substitute to take the place of one of excellent make which had broken down at a most inopportune time. The Physical Therapy Department of the Hospital for Joint Diseases, in New York City, was being expanded under the direction of the writer, and the increased patronage of the department was already taxing our facilities to the utmost. The sudden loss of the low volt machine was keenly felt, but so extensive was the damage that prompt repair could not be promised. So the first flasher machine came into existence, designed and built by the writer in a single evening. As time did not permit construction of a mechanical interrupter, a small sign flasher was connected into the input circuit to interrupt the current as it entered the first transformer. As events later proved, this substitution was a most fortunate one. The machine was crudely constructed, but is still in constant use in our busy clinic. In all the intervening years it has suffered no breakdown of any kind, and on two occasions required only resetting of its rheostat knob. It shows no sign of wear, and apparently is good for many more years of service. This original machine was built to deliver only a rhythmically interrupted alternating current, and has no vacuum tubes.

When our costly mechanical generator had finally been repaired and returned, the flasher machine was set aside as having done its duty. But our patients were not satisfied with the change, and many demanded "the little machine which does not make any noise!" It was the mechanical generator which was finally retired, the flasher machine remaining in its place.

Since these early days several changes have been made as more machines have been built. The first surger model of the machine was built shortly after the original one, and this also has given unfailing service. With the exception of a tube which showed defects on the third day of use, this machine has required no service, care or adjustment during its many years of heavy clinic use, and is now just as clean and serviceable as the day it was put in commission. Having a controlled six volt current at one point of the circuit, it was found that the simple addition of binding posts suitably connected would furnish an excellent current supply for a small diagnostic light.

Late in 1928, a diagram of the surger model circuit was sent to a practitioner in Germany at his request. In June of the following year application for a German patent was made by a physicist of that country, and the patent was later issued. The writer has at no time desired to protect any part of the machine by patent issue, and photographic copies of the

diagrams have been freely sent to all parts of the world.

All of the latest models have been adapted, by means of a simple by-pass system, to be used in conjunction with the diathermy current. No special setting is required in either machine for this purpose, and each is controlled independently. This is a particularly valuable combination in treating a damaged muscle following disease or injury. The diathermy current is applied in the usual manner, but with the sinusoidal generator connected in the circuit. The current of the latter is not applied except during the last few minutes of the treatment. Then, with active hyperemia established by the diathermy, the sinusoidal current is added without interrupting the diathermy application. The muscle is stimulated gently while in the best possible condition for the treatment. For other purposes the sinusoidal current can be applied throughout the diathermy treatment if desired, though if this is done exhaustion must be closely guarded against.

The flasher sinusoidal machine is particularly useful in treating children and nervous individuals, as it is silent and quite proof against shock or other accident. It is ground free, and the control knob is not electrically connected with any other part of the circuit. It is extremely safe, as the entire output is derived from a five watt transformer. As already mentioned, no oiling or other service is required, and wear is negligible even after many years of severe use. The vacuum tubes used are of a standard radio receiving type, and are obtainable everywhere at very small cost. In ordinary use the life of the tubes may be expected to extend over many years.

65 Buckingham Road.

Artificial Radioactivity Seen as Aid in Cancer Fight — Man-Made Radioactivity May Prove to Be Effective Substitute for Expensive Radium in Medicine

The struggle of medical science to combat cancer has been materially aided by the recent discovery of ways to make many common elements radioactive by artificial means, Dr. G. Failla, head of the physical laboratories of Memorial Hospital, New York City, has informed Science Service.

Dr. Failla's encouraging statement was made in reply to a request for interpretation of the announcement by Prof. E. O. Lawrence of the University of California that a way had been found to make sodium radioactive and have it give off penetrating gamma rays and beta rays. (See SNL, Oct. 27 p. 259.) Gamma rays from man-made radioactive sodium are over twice as piercing as those from the most powerful natural sources, thorium C".

The main difficulty in the treatment of cancerous tissue by radiation, Dr. Failla declares, has been to find some carrier which will distribute itself fairly uniformly throughout the tumor without diffusing into the surrounding normal tissue and through the blood stream. No such selective carrier is available at present although chemists the world over have been searching for it for decades.

"The advent of artificial radioactivity opens new fields of cancer research," Dr. Failla declares. "In their search in the past for chemical agents suitable for the treatment of cancer, chemists have concentrated their attention on agents which damage the living cell hoping to find something which would kill cancer cells without harming irreparably normal cells and the patient as a whole.

"With the coming of radioactivity induced by artificial means it is only necessary to look for something which is selectively or even differentially absorbed or temporarily retained by cancer tissue.

"When and if such a substance is found it will then be possible to make one or more of its constituents artificially radioactive. By virtue of its greater concentration in cancer tissue such tissues would be destroyed readily by the radioactive rays while normal tissue would survive."

Fifteen years ago scientists at Memorial Hospital prepared radioactive salt by exposing it to radon for three hours so that the disintegration products — radium A, B and C — were deposited on the salt. By dissolving this special salt in water a radioactive solution was obtained which could be injected directly into tumors, or into the blood stream for special cases where there was a general neoplasmic condition throughout the body.

The method was tried extensively on animals and human patients, but was finally abandoned. Radioactive oils and suspensions of charcoal containing radon, or its disintegration products, were also tried at Memorial Hospital with little success, Dr. Failla indicated. — *Science News Letter*, November 17, 1934.

ZINC IONIZATION IN INTUMESCENT RHINITIS *

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Zinc ionization is applicable for the reduction of intumescence of the inferior turbinates which have become obstructive and impair free breathing. It is simple to apply and satisfactory in suitable cases.

The inferior turbinate has been the seat of operations and cauterizations for years, until time and experience have proved that the destruction of the mucosa was not the proper approach for this form of nasal obstruction. It became evident that the retention of the mucosa with maintenance of function was the desirable objective. With this in mind, submucous resection of the inferior turbinate has been done. This however left a flopping, pendulous, although smaller turbinate. Injection of the submucosa with various solutions to bring about fibrosis and ultimately sclerotic changes has been made and satisfactory results reported. A method of electrocoagulation was reported by me in 1925, and later by Beck, of Chicago, and by Hurd, of New York. Their technic is quite an improvement over mine. There is no doubt as to its efficiency, but it gives an immediate reaction which is annoying. It causes scarification within the turbinate which reduces its size and prevents turgescence. Zinc ionization, however, acts only on the mucosa.

Clinically, intumescent rhinitis is characterized by intermittent nasal obstruction which is particularly annoying at night and is usually associated with a slight nasal discharge and occasional attacks of sneezing. These patients are sensitive to the slightest atmospheric changes, and at times are quite free from symptoms. Intranasal examination reveals turgescence of the nasal mucosa especially over the inferior turbinates, and there is also a thickening of the mucous membrane over the septum. The membranes shrink readily under the application of epinephrine and there are no hypertrophies. Chronic sinusitis is responsible for some of these cases, and is benefited by measures leading to improvement in aeration. However, poor hygienic conditions are almost always a factor and probably the most important cause of this obstruction. The situation is a difficult one to manage, and calls for general as well as local therapy. Hygienic surroundings must be improved and the patient must have fresh air, sunshine, and sufficient exercise. A change of climate is always beneficial.

Zinc ionization of the mucous membrane of the nose is a method which recommends itself for selected cases. The galvanic current is not new as a therapeutic agent, and has been used in other fields. Feldman[1] used a copper electrode in the nose, claiming improvement in 80 per cent of his patients. Friel[2] and others have used zinc ionization in chronic suppuration of the middle ear with satisfactory results. St. Clair Thompson[3] quotes Creswell Baber as successfully using a positive galvanic current in nasal hydrorrhea. The treatment is applied to one side at a time. The positive pole of the galvanic apparatus is connected with a zinc wire. The latter is wrapped in cotton, soaked in a two per cent zinc sulphate solution and made wide enough to cover the inferior turbinates. Additional packing is placed above this, and dry cotton is packed around the applicator to prevent a short circuit. The negative applicator, consisting of an ordinary flat cotton covered disk, is held tightly in the patient's hand. The current is then gradually turned on and allowed to flow for 15 minutes. There is at first considerable sneezing which subsides in a few minutes. The strength of the current is about six milliamperes, just enough to avoid pain. On removal of the packing the mucous membrane appears shrunken and gray. This treatment must be repeated from three to ten times at intervals of several days until the desired increase in space is obtained. Ionization is equally useful in cases of ethmoiditis which causes secondary turegescence of the inferior turbinates.

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(For Discussions See Page 103)

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ZINC IONIZATION IN OTOLARYNGOLOGY *

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I do not know that I can offer anything new in the treatment of ear, nose and throat conditions with ionization, except to report the successes and failures I have had with this type of treatment.

Friel, of London, England, is one of the pioneers in using ionization in otolaryngology and has done a great deal to establish its clinical value. Friel states that zinc ions inhibit the activity of bacteria and are antiseptic in their action.

Nose

Rhinitis. The causative factors are still undetermined. Some claim the disease is due purely to bacterial invasion, others believe that it is the result of metabolic changes, and still other groups believe that there is a focus of infection in the nasal accessory sinuses. The predisposing factors are anatomic variations such as deviations of the septum, spurs, ridges, and adenoids, which interfere with normal drainage and ventilation of the nose and the accessory sinuses. Other causes are occupational and local irritants, such as dust, vapors, pollen, and the internal administration of certain drugs and foods.

Repeated attacks of rhinitis produce chronic alterations involving turgescence, hyperplasia, and marked hypertrophy of the mucosa. At first, we have a simple engorgement of the blood vessels, which may be followed by an increase in connective tissue formation.

The most prominent symptoms are obstruction and more or less nasal discharge. The obstruction is intermittent and is usually worse after meals and at night. There is generally a collection of mucous in the nasopharynx which gives rise to hacking, spitting, coughing and respiratory discomforts.

In dealing with sinusitis we nearly always have two conditions present, namely:

1. Nasal obstruction which interferes with the proper drainage and ventilation of the sinus.
2. Invasion of bacteria.

Sinus surgery has in a great many cases not given us the results desired. In fact, many patients have been made worse. It seems to me, therefore, that we should not be too hasty in operating and thus destroy vital structures, but should adopt a more conservative plan, except in the purely surgical cases. By correcting intranasal obstruction through a submucous resection of the nasal septum, many cases of sinusitis are cured or greatly relieved without any specific treatment to the sinus. Cases with a marked hypertrophy of the mucosa are not materially improved in spite of anatomic correction, and in these cases, it is customary to perform a complete or partial turbinectomy, to cauterize the tissues, and the like, resulting in scar formation. These procedures are unnecessary except when the bony structure of the turbinates presses tightly against the septum. One or two zinc ionization treatments will bring about a sufficient amount of shrinkage to permit proper ventilation and drainage without interfering with the normal function of the mucous membrane.

In my hands zinc ionization for the treatment of catarrhal sinusitis in children has given splendid results. After one treatment the child is relieved of the constant nasal discharge, hacking, or spitting. Nasal respiration is improved, sleep is sound instead of restless, and there is a marked change in physical and mental make-up.

From clinical observations I am convinced that through ionization the medication is carried into the sinuses, as is evidenced by the results I have achieved.

Proetz, of St. Louis, has definitely proven that by a wave-like motion the cilia of the nasal mucous membranes are constantly moving any medication, foreign substances, etc., on the mucous surfaces toward the vestibule of the nose. This explains why topical applications of drugs to mucous membranes of the nose do not give us the expected results. Since ionization drives, so to speak, the medication into the tissues, our end results necessarily are much better than any other method of applying medication to the nasal chambers.

* Read at the Twelfth Anual Session of the American Congress of Physical Therapy, Chicago, September 11, 1933.

Treatment is divided into two parts, namely:

1. *General* — This is administered by the general practitioner, and should include proper measures for any constitutional disorder which may exist and the regulation of diet and hygiene.

2. *Local* — This consists of eradicating and correcting any predisposing intranasal deformities or obstructions. After this is done, some type of treatment should be given which will restore the tissues to their normal state. To bring this about I have used zinc ionization during the past six years and it has given me far better results than any type of treatment I have used theretofore.

The technic is as follows:

1. Cleanse the nostril thoroughly removing all mucous, crusts, etc.

2. Swab with a four per cent cocaine solution two or three times.

3. Pack the nostril with strips of gauze saturated with zinc sulphate solution (one-fourth to one per cent), leaving enough space at the bottom to permit the insertion of a zinc needle, which is wrapped in cotton and saturated with the solution.

4. Attach the positive galvanic terminal to the needle. Apply the negative terminal to a sponge soaked in normal salt solution, which is either placed at the base of the neck or held in the hand by the patient.

5. Turn the current on slowly to about ten ma., if the patient can tolerate it, and run for ten minutes. In other words, we give 100 milliampere minutes treatment at one sitting (milliampere minutes are computed by multiplying the milliamperage by the length of treatment time in minutes).

6. After the time is up, remove the packing.

The treatment is painless. The patient will experience a metallic taste and the saliva will flow rather freely. On inspection of the nasal passages one notices a grayish appearance of the mucous membrane which will remain there for several days. Following the treatment there may be a reaction which varies in individuals. There is always a swelling of the mucosa which after the first twelve hours gradually shrinks. At the end of a week a decided shrinkage of the turbinates takes place, resulting in improved ventilation and drainage. I treat only one nostril at a sitting to avoid too intense a reaction for the patient to tolerate. If a second treatment is necessary, I usually give it about three weeks following the first. One treatment, if effective, is good for at least six months. There are no contraindications.

Following surgery of the nasal accessory sinuses, I use zinc ionization in all cases where the sinus is accessible. In chronic suppurative maxillary sinusitis, I first establish adequate drainage by making a large window into the antrum. This is followed by zinc ionization of the sinus according to the technic given above. The results are very gratifying. Since I have employed this method I have not performed a radical operation on the maxillary sinus.

As an adjunct to the treatment of hay fever, I have used zinc ionization. The treatments are given about two weeks prior to the onset of symptoms. My results have been so favorable that zinc ionization of the nasal chambers is now a routine method in the treatment of all hay fever cases.

In selected cases, zinc ionization of the nasal chambers and accessory sinuses is the method of choice. Better and far more lasting results are obtained by it than by any other form of treatment. The only disadvantage is the reaction following treatment, which in some cases is very distressing. In my hands this reaction takes place regardless of the strength of the solution, for which reason I have been using almost exclusively a one per cent solution.

Ear

Zinc ionization of the ear has been limited to chronic suppurative otitis media. Other conditions such as polypi, or furunculosis, lend themselves better to other forms of treatment. Here again the cases must be selected, because zinc ionization will not cure all discharging ears. Best results are obtained in chronic suppurative otitis media, provided the opening in the drum membrane is large enough to permit the solution freely to enter the middle ear. Zinc ionization gives good results in chronic suppurative otitis media, provided there is no bone necrosis or cholesteatoma present. Before discussing the method of treatment, I wish to state that I always treat the nose and throat of every patient with an otitis media. We know that the great majority of middle ear infections come from the nose and throat. It is there-

fore just as important to treat the source of infection as the affected part, if one expects to get good results.

1. Cleanse and treat the nose and throat.
2. Inflate the middle ear by the use of the eustachian catheter or, if this is impossible, as in young children, inflate by politerization.
3. Cleanse the external auditory meatus thoroughly.
4. Have the patient lie down with the affected ear upward. A padded electrode saturated with normal salt solution attached to the negative pole is placed on the face opposite to the side to be treated. Insert a rubber ear speculum into the ear and fill the canal with a one per cent zinc sulphate solution. Immerse the zinc needle attached to the positive pole into the solution. Turn the current on slowly to the tolerance of the patient which usually ranges between one to three milliamperes. Be sure to keep the needle immersed by adding more solution from time to time. Give a ten to twenty milliampere-mintues treatment. Turn off the current slowly. Cleanse the ear carefully.

I always prescribe treatment to be used by the patient at home. I never prescribe aniline dyes because they discolor the tissue and in examining the ear one cannot get a true picture of the condition of its tissues.

In chronic otorrhea, I have also used a one per cent copper sulphate solution with very good results.

Following a mastoidectomy, I use zinc ionization in the mastoid wound as well as in the external auditory meatus and find that I obtain better and quicker healing. After a radical mastoidectomy, I use zinc ionization and find that the discharge following the operation is cleared up in a much shorter time than by the methods formerly used to stop the drainage. Age plays no rôle so far as ionization treatment is concerned.

Conclusions

1. Zinc ionization, a non-surgical procedure performed in the office is of unusual benefit in selected cases.
2. Intumescent and hypertrophic rhinitis lend themselves admirably to zinc ionization.
3. Zinc ionization is a valuable means in the treatment of the nasal accessory sinuses.
4. Following intranasal surgery, zinc ionization is an ideal method of restoring the nasal tissues to normal.
5. Zinc ionization is the method of choice in the treatment of suppurative otitis media in selected cases.

24 Stokes Bldg.

(For Discussions See Page 103)

CHRONIC OTORRHEA WITH SPECIAL REFERENCE TO ZINC IONIZATION AND ULTRAVIOLET *

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Treatment of conditions of the middle ear and of the labyrinth resolves itself into: (1) *local therapy*, which includes topical applications, inflation, diathermy, ionization, massage of the ossicles, and surgery, and (2) *systemic therapy*, embracing management of the underlying systemic disease of which the local manifestation involves the ear. When diabetes, nephritis or pulmonary tuberculosis coexists with a persistent middle ear suppuration, thorough treatment of the constitutional disease is usually necessary for cure of the aural discharge.

Symptoms of dizziness and tinnitus are intimately correlated with a hyper-irritability of the central nervous system. The neurotic, hypersensitive patient reacts to these sensations with his usual nervous and emotional responses. What is more, the symptoms appear to increase the irritability of an already sensitive, nervous mechanism, gradually producing neurotic manifestations. A vicious circle is created, the ramifications of which render dangerous consequences to the patient and make the physician's task difficult. The indication is to break this vicious circle by reducing the nervous excitability and lowering the reaction by measures best adapted to the individual case.

Symptomatic vs. Specific Treatment

A good therapeutic principle which is frequently overlooked in the practice of otology is that the treatment should be directed at the pathologic process as well as at the subjective symptoms. In otosclerosis and in chronic atrophic, hypertrophic, and adhesive otitis media, the pathologic process frequently involves fibrous, calcareous, and spongy changes in the tissues.

Obviously the indications in such involvements are to employ every available means to halt these transformations. Whether this is done by diathermy, ultraviolet, the x-ray or drugs is immaterial, so long as the desired results are obtained.

Too often a patient comes to the otologist with an obvious clinical picture and treatment is promptly begun without a comprehensive general examination. Later it is sometimes found that laboratory tests and a general examination would have aided greatly in an improved end result.

At this point it is not amiss to emphasize that overenthusiasm in the use of physical therapy in otology is not conducive to the best interests of this specialty. While physical measures are valuable aids, they should be used as such in as scientific a manner as possible. Although I am a great enthusiast of physical procedures and employ them extensively in my practice, I have not as yet found any of them which has a specific action. I have learned, however, that with the added use of physical methods my results in many cases were better and more promptly obtained.

In chronic suppurative otitis media, the reports of cures with zinc ionization are more glowing than what experience has demonstrated. In my own work I have found that only a selected group of patients respond to this treatment. In this connection, Asherson[1] has stated that the type of suppurating otitis media that responds specifically to ionization is that coming under the heading of tympanic infection, that is to say, when the suppuration is limited solely to the mucous lining of the tympanic cavity, with adequate drainage, absence of bone suppuration, and no cerebral or mastoid extensions.

Hollender has aptly pointed out on numerous occasions that no case should be subjected to ionization unless a correct diagnosis has been made and the case carefully selected as lending itself to this kind of treatment. It is unfair to any method to apply it indiscriminately, and then because of failure, to pass unfavorable judgment on the method which in an appropriate case might prove successful.

My personal experience has been very gratifying with results obtained in selected class.

But what are we to do for those not classified for ionization? Are we to be satisfied

* Read at the Twelfth Anual Session of the American Congress of Physical Therapy, Chicago, September 11, 1933.

with some cleansing procedure and a prescription to the patient for some borated alcohol, often without result. The answer is that it is a good therapeutic principle that treatment should be directed at the lesion as well as at the subjective symptoms.

Ultraviolet Therapy

A method which I have found beneficial in many instances in which ionization and other procedures have failed consists of the use of ultraviolet preceded by the instillation of one of the analin dyes. The results often are gratifying enough to emphasize the value of this treatment in stubborn cases which persist in discharging in spite of conscientious efforts to cure them. Without further details concerning technic I cite the following case reports as illustrative of my experiences with ultraviolet therapy in chronic otorrhea.

Report of Cases

Case 1. — Mrs. L., aged 28, consulted me with a history of periodic attacks of pain in the right ear with drainage of pus that often had a very bad odor. This has been persistent since childhood after an attack of scarlet fever. Examination of the ear showed a foul discharge, granulations, and necrosis. She had a secondary anemia. This patient was treated with mercurochrome and ultraviolet. The ear was first cleansed with salt solution, and all debris wiped away, after which 1 cc. of a 5 per cent aqueous solution of mercurochrome was instilled in the ear and allowed to remain for five minutes. The ear was then wiped dry and ultraviolet applied directly for three minutes. This was repeated at intervals of five days. After eight such treatments the ear was entirely without discharge. In addition to the local treatment, she was given intravenous injections of iron arsenate and copper every six days. After six of these injections a differential blood count was made, which showed a marked improvement in the anemia, the red count having risen from 3,300,000 to 4,400,000 and the hemoglobin from 60 to 75 per cent. She was also given a diet rich in calcium. For the past six months there has not been any evidence of discharge, and she has reported for observation at regular intervals.

Case 2. — Mrs. R., aged 20, consulted me with a history of discharging ears since early childhood. Five years ago a radical mastoid was done on the right ear. The left ear has discharged continuously with odor at times very offensive. The ear was cleansed with salt solution and wiped dry. The drum had been entirely destroyed, and the tympanic cavity was granular with bone suppuration.

Her general appearance indicated a toxic state. She had eczema of the auditory canal. The blood count was R. B. C. 4,200,000, W. B. C. 12,200. Hemoglobin 60 per cent, Kahn test, negative.

This patient was started on mercurochrome and ultraviolet. The granulation tissue was removed by applications of silver nitrate. Potassium iodid was given internally, and a calcium diet ordered. Ultraviolet was repeated every four days. Under this treatment there was a slight diminution in the discharge and the odor disappeared. However, when last seen she still had a slight mucopurulent discharge.

Case 3. — Miss C., aged 22, gave a history of left ear discharge for about ten years. Had a severe attack of influenza with middle ear abscess which ruptured producing discharge since that time. The patient states she can not remember when she was free from it. There has been an odor which at times was very offensive. On examination the auricle was red and swollen, a raw bleeding surface extending back into the auditory canal. The ear was cleansed with sterile salt solution and wiped dry. The drum membrane had disappeared and the tympanic cavity showed evidence of necrosis. The differential blood count showed an increase in W. B. C. to 11,500, the urine a trace of albumin. Kahn test negative, N. P. N. 95 mg., sugar 21. General physical condition good.

This patient was started on the mercurochrome and ultraviolet treatment. Calcium diet and potassium iodid in increasing doses to tolerance was ordered. An ointment of yellow mercuric oxide was daily applied to the outer auricle and canal. Improvement was most marked, and after six weeks treatment at intervals of four or five days, the discharge had decreased, the odor had disappeared, and the eczema of the auditory canal cleared. The discharge has never entirely disappeared, but there are periods of three or four weeks when there will be no evidence of it. Whether this will eventually cease entirely, I am unable to say, but the above treatment is being continued with that aim in view. When last seen the hearing had been partially restored, the auditory canal and tympanic cavity presented a healthy appearance, and there was only the slightest evidence of a thin mucous discharge.

Summary and Conclusions

1. All cases of chronic purulent otitis media should receive careful physical examinations, and where indicated, systemic as well as local therapy should be instituted.

2. Statements regarding specific effects by diathermy or ionization should be more guarded and modified.

3. When ionization and other procedures fail, resort should be had to ultraviolet therapy.

4. Calcium and calcium diet seem to have a marked beneficial effect in the general upbuilding of the patient.

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Discussion of Papers by Drs. M. L. Harris, Carl B. Sputh and Garnett P. Morison

Dr. H. W. Bau (Chicago): In 1922 I began to use zinc ionization in the treatment of chronic running ears. I had my failures just as the other men had, because I did not pick my cases. I then began to realize that zinc ionization, like any other method of treatment, must be individualized in that we must select our cases in which to use it. I found, in the first place, that in order to use zinc ionization in the ear there must be a large drum perforation. Many times we attempt to treat a chronic otitis media with a pinpoint perforation. We know the zinc sulphate solution cannot enter the middle ear and, consequently, we cannot get satisfactory results. In the second place, we must be sure that there is no mastoid involvement. It is useless to treat with zinc ionization a chronic running ear with mastoid destruction.

In the third place, we must see that all foci of infection of the nose and throat are removed. No method of treatment in the ear will be beneficial without such attention.

Then there are certain contraindications. In the first place, we must be absolutely sure we are not dealing with an inner ear disease. Zinc ionization can do a lot of harm in these cases and also in cases where there are cranial complications.

Zinc ionization is contraindicated in cholesteatoma, in spite of the fact that Friel cites a case he treated with zinc ionization and obtained a complete cure.

In regard to zinc ionization in the nose, I am sorry to state that my results have not been as good as those of the essayist's. I did not get shrinkage in one, two or even three treatments. Many times I had to treat them ten, twelve, and even fifteen times before I got any change.

The treatments are not as easy as stated. The patient goes through ten or fifteen minutes of misery in many cases. Many of these people will not come back for a second treatment. For that reason I have given up zinc ionization of the nose, and am now limiting myself to electrocoagulation.

In the radical mastoid cases you will get a quicker clearing up of the discharge if you follow your operation by zinc ionization. I have had a number of these cases where, after treating for six, seven or eight months, the discharge continued, and then I would give them two or three zinc ionization treatments and the discharge cleared up.

Dr. Gardiner S. Reynolds (St. Paul, Minn.): Dr. Morison's discussion is refreshing. It should be obvious that when a doctor treats all cases of otitis media with zinc ionization, he lowers himself to the level of a technician. He, in fact, really abolishes the necessity for his professional existence. Any good technician could do as well.

Further, any one treating all cases of otitis media by ionization is injuring his professional reputation by failing to secure the results that he would otherwise get. It is evident that such a physician is not exercising judgment and discrimination. The implication to the patient is that the therapeutic armamentarium of such a physician is limited.

The diagnosis and general care of such a patient should be in the hands of the otologist, while the technical side should be in the hands of the physical therapist as the necessary equipment and technic require the supervision of someone who is especially interested in the subject. Not commonly we find a doctor who is really competent to handle both sides of the case.

The statement quoted from Dr. Hollender should be read and re-read.

Dr. Albert H. Andrews (Chicago): I have not had the satisfaction in the treatment of intumescent rhinitis that some of the essayists have had. I have seen some good results. I think perhaps I will try it again with a little different technic and see what results I can get.

Dr. Sputh spoke of four per cent cocain. Four per cent cocain will anesthetize a nose fairly well. Pure powdered cocain will anesthetize it better. As far as danger is concerned, it lies with the solution, for the powdered cocain is so active, it locks itself out of the tissues. In thousands of cases in which I have used it, I have yet to see my second constitutional disturbance from the use of powdered cocain in the nose. I saw one done by my assistant. He did not precede it with adrenalin; he used an excessive amount, and the patient became talkative.

Dr. Morison very properly cautions doctors against making exaggerated claims for results in the use of any one specific line of treatment.

We all agree that treatment should be directed at and applied to the pathologic condition. However, it is not easy to determine in any case of otitis media the character and extent of the disease. The Eustachian tube, the middle ear, the attic, antrum, and the mastoid cells are all a part of the upper respiratory system, and it is difficult to imagine the middle ear being filled with pus without the attic, antrum, and mastoid being involved.

Capillary absorption is a good adjunct to zinc ionization of the ear. Pack the ear full of gauze and have it removed before it becomes thoroughly saturated. That absorbs the moisture as fast as it is formed, draws the microorganisms with it, and lessens the infection.

Odor is no criterion of the curability of a case of otitis media. A bad odor simply means that the ear has become infected by some saprophytic germs, and they are not the germs that are causing the difficulty in the ear.

Let me call your attention to the fact that electricity follows the direction of least resistance. You never know just how much current you are getting in the middle ear when you fill the canal with fluid. A certain amount of it goes out through the walls of the canal, and a certain amount of it through the middle ear. The less fluid you have in the canal, providing you make your contact, the more nearly you can control

the amount of current in the ear where you need the current.

Dr. M. H. Cottle (Chicago): Proetz has written about the displacement of fluids in the sinuses. You know very well that you can introduce fluid very simply into all the sinuses, and it would be simple to combine that with zinc ionization, if you saw fit in certain cases where you are not getting results. For those who are having a little difficulty with it and are still following the technic which we have tried to forget during the past ten years, rather than be reminded of it, I would suggest you add displacement of fluids in the sinuses. When you do your zinc ionization, place your patient on a table or a couch, don't try to do it with the patient sitting up because the fluid is continuously coming out of the nose instead of covering as much of the nasal mucosa as possible.

Dr. L. B. Williams (Toronto, Canada): I have tried to be as fair with zinc ionization and electrocoagulation of turbinates in my practice as I could. My definite opinion is that electrocoagulation is by far superior.

Dr. Carl B. Sputh (closing): In treatment of eye, ear, nose and throat condition, whether you use physiotherapy or other forms of treatment, you have to look after the general systemic disorders just as well as you do the local pathologic processes. Our treatment has been divided into general and local.

The question was brought up by one of the discussants, I believe Dr. Reynolds, as to who treats the patient. I certainly don't give physiotherapy treatments. My technician, who has been with me for six years, is trained to do that. I make the diagnosis, prescribe the length of treatment and the strength of the current to be used, and she gives it.

Scientists Cooperate With Government Through Science Advisory Board

The Science Advisory Board, appointed by President Roosevelt on July 31, 1933, represents a new form of cooperation of the nation's scientific personnel with the government in its varied scientific services. It supplements and cooperates with the National Academy of Sciences and the National Research Council, which were established during the national emergencies of the Civil War and the Great War respectively, to aid the government, and which play an important role in the organization of the nation's scientific forces for increased effectiveness in ordinary times and particularly in times of stress.

The science Advisory Board has submitted to the President of the United States a report on its work from the date of appointment to September 1, 1934. While the details of this report can only be made public subject to release by the President, there is no impropriety in disclosing the general scope of the subjects which have engaged the study of the Board and its committees. Important among these subjects have been the program of the U. S. Weather Bureau, with particular reference to methods of weather forecasting and the cooperation of other governmental services; cooperation with a committee of railroad presidents to determine fundamental aspects of policy and organization, for insuring to the railroads the best contributions from modern science; question of organization and program in the U. S. Geological Survey and the U. S. Bureau of Mines, with particular reference to the need for more adequate handling of mineral statistical information; re-definition of the functions of the U. S. Bureau of Standards, with detailed consideration of its program and needs and particularly its method of cooperation with industry in the establishment of trade and commercial standards; a study of the surveying and mapping activities of the government distributed through 28 government bureaus, with particular consideration of efficiency in mapping and efficient service of mapping agencies to organizations which need maps for their operations; the formulation of a scientific basis for studies and administration of problems of land use, including soil erosion; preliminary studies of the chemical services of the government and also of certain features of a program for stimulation of new and preferably non-competitive industries.

In handling each of these and similar problems, the Board has established committees of prominent scientists and administrators who are pre-eminently competent in their respective fields, and including on each committee one or more members of the Board. These committees have carried on the detailed studies and formulated recommendations which have then been presented to the Board, forming the basis of the Board's reports to the Department Secretaries or other administrative officers of the government. This procedure has worked effectively and rapidly, and the response of leading scientists and engineers to requests by the Board for their services on these committees has been uniformly gratifying and has demonstrated the eagerness and effectiveness with which such men are willing to devote their time and energy to government service for the sake of the most efficient operation of the government services which relate to their particular fields of interest. These committees, as well as the members of the Board, have served entirely without compensation. — *Science News Letter*, December 29, 1934.

ARCHIVES of PHYSICAL THERAPY, X-RAY, RADIUM

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Editor: DISRAELI KOBAK, M.D., CHICAGO

EDITORIALS

ULTRAVIOLET FLUORESCENCE IN CLINICAL MEDICINE

The clinical application of ultraviolet is definitely becoming enlarged in scope as research is unfolding new diagnostic and therapeutic indications. The peculiar characteristics of ultraviolet fluorescence of human tissues, as of many inorganic substances, permitting differentiation, not only between various structures but also between normal and pathological conditions in the very same structure, led to its intensive study for diagnostic purposes. Thus the great difficulty of recognizing certain types of malignant growths whose clinical characteristics have the aspect of benignity can be greatly overcome by subjecting neoplasms to the influence of fluorescence. It has been already demonstrated beyond cavil that certain types of structures will under fluorescence manifest a display of definite colors typical for them and in distinct contrast to others of various types of tissues. It is clear that such inherent characteristics which are invisible under natural or artificial light but distinctly appreciable in a darkened chamber, present a valuable addition to our diagnostic armamentarium.

Sutro and Burman[1] elsewhere in this issue present a highly instructive contribution on this theme, especially valuable because it subordinates the purely theoretical to concrete applicability in clinical practice. Basing their work on experimental as well as pathologic studies they have shown the comparative ease with which the diagnostician can augment even his preoperative material, and that by means at once simple and inexpensive. It has been suggested that this new diagnostic method suffers from the disadvantage of being a quasi-colorimetric system which requires normal color vision of the diagnostician. It is naturally true that an individual afflicted with color blindness cannot avail himself of this as of the many other procedures exacting normal vision. This criticism, if applied consequentially as an evaluation, would immediately remove from our diagnostic laboratories virtually the entire range of serology and blood chemistry, to say nothing of even routine urinalysis. Fortunately, color blind individuals are few and far between and those so handicapped can easily obtain assistance.

That this procedure has a distinct diagnostic value in the operating room with particular regard to a decision involving radical or conservative operation, has been recently pointed out by Blech[2] in clinical observations on growths of the mammary gland.

It goes without saying that the findings in tumors of the breasts are identical with tumors elsewhere in the human body.

But it is not only for the differentiation of neoplasms that ultraviolet fluorescence has diagnostic value. It is clear from the nature of the phenomenon that it is equally applicable to the diagnosis of a large number of exposed superficial lesions. This, then, shows that the time is not far distant when ultraviolet fluorescence will become essential as a means of greater diagnostic refinement in dermatologic practice. The same holds good for quite a number of external surgical lesions characterized by loss of the covering structure, as for example, ulcers, fistulae, and the like.

There is also evidence that fluorescence can be utilized for therapeutic purposes, at least indirectly. According to certain observations by Eising,[3] mineral oil or vaseline exposed in free air to ultraviolet light, such as emanates from a mercury vapor arc in quartz, undergoes changes wherein both substances acquire photoactive properties. Thus exposure of a photographic emulsion to the irradiated petrolatum results in the development of an image. Russell,[4] in 1898, pointed out that fluorescent liquid substances of the most diverse character render a photographic plate capable of development, a phenomenon that has since been designated as the "Russell Effect."

Eising's interpretation of the activity of irradiated petrolatum is very easily explained on the basis of the "Russell Effect" in that exposure of the substance to ultraviolet light results in the breaking down of certain of the constituents which later give off particulate effluvium. There is much research to indicate that whereas ultraviolet light produces a "Russell Effect" in mineral oil, such oil may exert a bactericidal action, enhancing the value of petrolatum as unguents for surgical dressings. Huth's[5] discussion of Sutro and Burman's paper refers to Eising's phenomenon, to which Lillienthal[6] has added a confirmation in a report on a case of fistula of the lung following empyema.

From a purely scientific point of view the literature stressing the biophysical properties and the diagnostic applicability of ultraviolet fluorescence is comparatively large. It presents ample confirmatory evidence of its usefulness in clinical medicine, both diagnostically and therapeutically, which progressive physicians can no longer afford to ignore.

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BREAD AND BUTTER, AND PHYSICAL THERAPY

It is a universal observation that necessity is the great prod for adjustment to environment, a truth expressed by many aphorisms. In times of plenty, the physical and mental faculties tend to become relaxed and softened by the spirit of false security. We are content to rest until economic convulsions shatter our quasi-somnolence and compel us to erect suitable defense against them.

There is little need to point out that from an economic standpoint the medical profession is in the very midst of such an experience. Hopes, false and true, have been stripped to the very bone. The struggle today is for existence, for the very bread and butter of life, hence it is opportune to evaluate our therapeutic possessions in order that we may find values so basic as to assure us at least a certain amount of economic protection until the storm has abated. To a great extent this is to be found in the selective qualities of physical therapy.

During the present economic disturbance the incidence of acute infections has been said to have so materially decreased as to force hospitals and nursing homes to reduce their overhead to the lowest level commensurate with operative maintenance. The world began to talk of a healthier age, a blessing in disguise, that came with general impoverishment. As a matter of fact this was but a half truth misinterpreted in our struggle for read-

justment to our environment. The chronically sick retained their chronicity or became relatively worse, and this without the aid of healers, adjusters, and "professional" mental healers. Neurotics and hysterical individuals found other outlets for their inverted activities. The acutely ill were taken care of by charitable nature or medical charities.

The remnant of private practice was still remunerative if scientific teachings, old methods and new practices were combined in proper proportions. Pain is still the *vis a tergo* that drives the individual to seek aid of the physician. The extra time at our disposal may well be utilized for a more detailed examination of the patient. Invariably such examinations disclose associated pathologic changes elsewhere, the care and relief of which usually operate to the advantage of both patient and physician. As an example, the tendency to look for focal points of infection of entrance and to neglect the search for focal points of exit has resulted in the sheerest neglect of one of the most remunerative opportunities for relief of symptomatic pain — the rectum. In proctitis, internal and mixed hemorrhoids, fissures of the rectum, and strictures, physical therapy in the form of negative galvanism alone offers specific effects. This treatment in addition is painless, bloodless and requires no hospitalization. The universality of these conditions as a product of civilization and their prompt relief by galvanism, provides the physician with an increasing source of income and the patient with an increasing source of release from pain.

One could dwell at great length on the equally distinctive effect of galvanotherapy in connection with the different forms of rhinitis and cervicitis; on its profitable application for soft pedunculated neoplasms of the skin and for the electrolytic removal of hair. Our neglected use of this agency has encouraged wide competition, and with the specialization of cosmeticians in electrolysis, the profession has turned over a profitable birthright even without the biblical exchange of a mess of pottage. With this inexpensive agency one should be able to obtain results so encouraging as to transform a dying practice into a living one. In this connection it is worthy of thought that the physician who avails himself of physical agents is not affected by the unethical refilling of prescriptions and counter-prescribing by unscrupulous pharmacists.

What iontophoresis has done for the increased interest in galvanism, radiathermy, with its spectacular pain relieving effect, has done for high frequency therapy. Both make for the greatest possibility of providing ample bread and butter to any physician who will make the effort to master their comparatively simple technics. The objection of cost may be answered by pointing out that the profits in satisfaction and increased economic ease are extraordinarily in excess of the original outlay. The selective heating of deep structures has opened up new therapeutic possibilities for relief of a host of affections heretofore uninfluenced by present day measures. Its favorable effect in acute inflammatory and purulent processes is significant of the fact that short wave therapy has a wide field of application. Schliephake and others reported its near specificity in furuncles, carbuncles, and like disorders. The consistent reports of its favorable action in the acute and chronic purulent affections warrant its wider use in chronic or acute sinusitis, ethmoiditis, osteomyelitis, and similar affections. Dalchau[1] points out that short wave treatment in gynecology has proved far superior to diathermy. He has also reported speedy relief in mastitis and many other forms of suppuration. Pelvic affections as elsewhere, appear to be rapidly influenced, with disappearance of subjective and objective symptoms.

There is so much to support our contention that bread well buttered may be found in the practice of physical therapy, that any further discussion would be like arguing upon a point that needs no argument.

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AMERICAN REGISTRY
OF
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NOTE. — The following plan for an American Registry of Physical Therapy Technicians is submitted after considerable deliberation and research. It will be found to possess broad scope and flexibility commensurate with the needs of an operative plan to control any future exigencies that may arise between the relationship of institutional and private physical therapy practice and that of the technician. The equitability of this plan is a recommendation for its adoption. — EDITOR.

Name

The Registry shall be known as the American Registry of Physical Therapy Technicians. It shall be directed by a Board composed of seven members.

Objects

The objects of the Registry are:

1. To receive applications for and issue certificates of registration to those who meet the educational and technical qualifications as given under "Eligibility for Certification."

2. To maintain the minimum standards of educational and technical qualifications as given by the Council on Medical Education and Hospitals of the American Medical Association for technicians administering physical therapy in hospitals, clinics and physicians' offices.

3. To cooperate with the Council on Medical Education and Hospitals of the American Medical Association in their investigation, classification, and periodical inspection of schools which conduct training courses for physical therapy technicians.

4. To conduct a placement bureau for registered physical therapy technicians and junior physical therapy technicians.

5. To promote the use of these registered physical therapy technicians and junior registered physical therapy technicians in hospitals and physicians' offices.

6. To cultivate high ethical standards among physical therapy technicians in accordance with the Code of Ethics.

Board of Registry

1. The Board of Registry shall be composed of seven members (which number shall include the chairman) to be appointed by the President of the American Congress of Physical Therapy. Only those members of the American Congress of Physical Therapy shall be appointed as members of this Board who practice physical therapy exclusively. These members shall be geographically located so as to represent the important centers of physical therapy activity in the United States. The members of the Board shall be appointed for a period of seven, six, five, four, three, two, and one year respectively. There shall be one new appointment each year and all appointments shall be subject to the verification of the American Congress of Physical Therapy.

2. There shall be an advisory board composed of representatives from national organizations interested in the work of physical therapy technicians and the physicians who use physical therapy in their specialties. This advisory board shall be composed of seven members and include one representative from each of the following organizations: The American Physiotherapy Association, the American Hospital Association, the American Orthopedic Association, and the American Neurological Association, the remaining three to be elected by the American Congress of Physical Therapy. The appointments shall be made by the represented Associations themselves, and the length of the term shall be four years. The other three members shall be physicians specializing in physical therapy.

3. The duties of the Board of Registry.

a. The Board of Registry shall pass on all applicants for registraton before they are admitted to examinations.

b. The Board of Registry shall arrange for the necessary examinations. These examinations shall be conducted by the Board at the annual meeting of the American Congress of Physical Therapy, or at the discretion of the chairman of the Board of Registry. He may authorize the holding of examinations by any member of the Board of Registry, who is then to act as chairman of a regional board. This regional board shall have the written approval of the chairman of the Board of Registry.

The regional board shall be composed of two

or more members, according to the local requirements. The members of the regional board are appointed by the Board member (chairman of the regional board) and his selection shall have the written approval of the chairman of the Board of Registry.

c. Questions for written and oral examinations together with directions for practical demonstrations shall be prepared by the Board of Registry or a committee of that board in collaboration with the advisory board.

d. It shall issue yearly a full list of registered physical therapy technicians and junior registered physical therapy technicians, classified alphabetically and geographically. This directory shall specify the qualifications for eligibility for certification.

Applications for Registration

Upon request, the registrar will furnish blanks on which formal applications are made for certification, with data to be filled in giving information as to the applicant's preliminary education, technical education, experience in physical therapy, training and experience in related fields, and references from two licensed physicians.

Eligibility for Certification

There will be two classes of certification:

A. Physical Therapy Technicians.

1. Applicants who were graduated from an approved school of physical therapy. The Board shall accept as approved those schools passed by the Council on Medical Education and Hospitals of the American Medical Association. (Until this Council has published its list of approved schools, the Board of Registry shall determine which schools are approved.)

2. Individuals who have worked in Physical Therapy for seven years or more in institutions or organizations acceptable to the Board of Registry. Applicants shall have had a high school education and shall be required to pass a written, oral and a practical examination given by the regional board. Registration in this group shall not be permitted after January 1, 1938.

Examinations: Passing grade 70 per cent.

Oral examination and practical demonstration of ability in all branches of physical therapy. Fifty per cent of grade.

Written examination covering all branches of physical therapy. Fifty per cent of grade. The result of these written examinations shall be inspected and approved by all members of the board.

B. Junior Physical Therapy Technicians.

Applicants who have completed high school education and have had four years of experience in physical therapy under the supervision of qualified physicians. These applicants shall be required to pass written, oral and practical examinations of a more limited scope. Registration in this group shall not be permitted after January 1, 1938.

Examinations: Passing grade 70 per cent.

Oral examination and practical demonstration of ability in at least one branch of physical therapy. Fifty per cent of grade.

Written examination covering fundamental subjects. At least elementary knowledge of anatomy and physiology and pathology of diseases commonly coming under treatment by physical therapy. Fifty per cent of grade.

After January 1, 1938, applicants for junior physical therapy technicians shall be required to have the following qualifications:

1. Graduation from an accredited school of nursing or physical education which meets the requirements set by law in the individual state, and in addition have had, not less than one year of training and experience in physical therapy, under qualified physicians.

2. Completion of 60 university credit hours, including 26 hours of physics, chemistry, zoology, biology, and in addition not less than one year of training and experience in physical therapy under qualified physicians.

Registration

Candidates for registration as physical therapy technicians and junior physical therapy technicians shall make formal application on blanks provided by the registrar.

Upon receipt of an application, the registrar shall conduct a preliminary investigation of the applicant and the result shall be filed with the application.

The fee for registration is $5.00 until January 1, 1936; after that date, $10.00. The fee is not returnable in case of failure in examination.

The applicant may, after the lapse of six months, be given the privilege of another examination without additional charge.

There shall be an annual registration fee of $2.00.

AMERICAN REGISTRY
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or more members, according to the local requirements. The members of the regional board are appointed by the Board member (chairman of the regional board) and his selection shall have the written approval of the chairman of the Board of Registry.

c. Questions for written and oral examinations together with directions for practical demonstrations shall be prepared by the Board of Registry or a committee of that board in collaboration with the advisory board.

d. It shall issue yearly a full list of registered physical therapy technicians and junior registered physical therapy technicians, classified alphabetically and geographically. This directory shall specify the qualifications for eligibility for certification.

Applications for Registration

Upon request, the registrar will furnish blanks on which formal applications are made for certification, with data to be filled in giving information as to the applicant's preliminary education, technical education, experience in physical therapy, training and experience in related fields, and references from two licensed physicians.

Eligibility for Certification

There will be two classes of certification:

A. Physical Therapy Technicians.

1. Applicants who were graduated from an approved school of physical therapy. The Board shall accept as approved those schools passed by the Council on Medical Education and Hospitals of the American Medical Association. (Until this Council has published its list of approved schools, the Board of Registry shall determine which schools are approved.)

2. Individuals who have worked in Physical Therapy for seven years or more in institutions or organizations acceptable to the Board of Registry. Applicants shall have had a high school education and shall be required to pass a written, oral and a practical examination given by the regional board. Registration in this group shall not be permitted after January 1, 1938.

Examinations: Passing grade 70 per cent.

Oral examination and practical demonstration of ability in all branches of physical therapy. Fifty per cent of grade.

Written examination covering all branches of physical therapy. Fifty per cent of grade. The result of these written examinations shall be inspected and approved by all members of the board.

B. Junior Physical Therapy Technicians.

Applicants who have completed high school education and have had four years of experience in physical therapy under the supervision of qualified physicians. These applicants shall be required to pass written, oral and practical examinations of a more limited scope. Registration in this group shall not be permitted after January 1, 1938.

Examinations: Passing grade 70 per cent.

Oral examination and practical demonstration of ability in at least one branch of physical therapy. Fifty per cent of grade.

Written examination covering fundamental subjects. At least elementary knowledge of anatomy and physiology and pathology of diseases commonly coming under treatment by physical therapy. Fifty per cent of grade.

After January 1, 1938, applicants for junior physical therapy technicians shall be required to have the following qualifications:

1. Graduation from an accredited school of nursing or physical education which meets the requirements set by law in the individual state, and in addition have had, not less than one year of training and experience in physical therapy, under qualified physicians.

2. Completion of 60 university credit hours, including 26 hours of physics, chemistry, zoology, biology, and in addition not less than one year of training and experience in physical therapy under qualified physicians.

Registration

Candidates for registration as physical therapy technicians and junior physical therapy technicians shall make formal application on blanks provided by the registrar.

Upon receipt of an application, the registrar shall conduct a preliminary investigation of the applicant and the result shall be filed with the application.

The fee for registration is $5.00 until January 1, 1936; after that date, $10.00. The fee is not returnable in case of failure in examination.

The applicant may, after the lapse of six months, be given the privilege of another examination without additional charge.

There shall be an annual registration fee of $2.00.

Title of Registrant

The certificate issued by the Board of Registry designating the holder as "Physical Therapy Technician," signifies a person who is qualified to administer physical therapy on the prescription of a qualified physician and who has fully met the minimum educational requirements and who has passed the examinations of the Board of Registry.

The certificate issued by this board designating the holder as "Junior Physical Therapy Technician" signifies a person who is qualified to assist a physician in administering physical therapy, and who has met the minimum education requirements and duly passed the examination as herein provided.

Holders of certificates may use the letters R. P. T. T. (Registered Physical Therapy Technician) or Jr. R. P. T. T. (designating Junior Registered Physical Therapy Technician) after their name.

All registered technicians shall be permitted to attend without cost sectional and annual meetings of the American Congress of Physical Therapy on the same basis of cost as the regular members.

Revocation of Certificate

A certificate may be revoked at any time for cause at the discretion of the Board of Registry. A hearing shall be granted upon request.

Candidates shall agree before admission to the register that they will at all times work under the supervision of a physician and that he or she shall not establish a private practice in physical therapy. Supervision by a physician shall be actual and not perfunctory. Registrants found to be practicing physical therapy independently of medical supervision shall be removed from the registry.

Incompetence and unbecoming conduct as determined by the Board of Registry shall constitute grounds for revocation of certificate.

An open hearing and adequate defense shall be satisfied by the following conditions:

1. The complaint must be made in writing to the chairman of the regional board who shall conduct a preliminary hearing.

2. The registrant must receive notification of this complaint at least twenty days in advance of the date set for the hearing. The notification is to be made by registered mail, telegram, radiogram or cablegram.

Appeal from the decision of the regional board may be made to the Board of Registry at the annual convention of the Congress. Such an appeal must be made in writing to the national chairman addressed in care of the American Congress of Physical Therapy, not later than thirty days prior to the opening date of the fourth-coming convention.

Reinstatement shall depend upon approval of the regional committee with final approval of the Board of Registry.

Code of Ethics

All registered technicians and assistants shall be required to strictly observe the Code of Ethics as defined by the American Congress of Physical Therapy; namely, that they shall practice only under the prescription and direction of a licensed physician and shall under no circumstances on their own initiative treat patients or operate an office independently.

SCIENCE, NEWS, COMMENTS

Missouri Physical Therapy Committee Appointed

At the annual meeting of the council of the Missouri Medical Association in Columbia, Nov. 19, 1934, the organization of a committee on physical therapy was approved. Drs. Alexander J. Kotkis and Frank H. Ewerhardt, St. Louis, were named members of the committee, with three other members to be appointed later. — J. A. M. A. **104**:482 (Feb. 9) 1935.

Ultraviolet Rays Make Rare Fish Transparent

Ultraviolet radiation, depended on by basking beach mermaids to give them a fashionable dusky sun-tan, is used for an exactly opposite purpose in preparing specimens of rare fish for laboratory study and museum exhibition. In a study reported to the New York Zoological Society, Miss Gloria Hollister describes its use in a new preservation and clearing technic which takes dark skin colors out and leaves the specimens in a state of x-ray-like transparency, with every delicate detail of bone structure visible.

The process makes it possible to study the internal structure of rare species without resorting to dissection — an important matter when there may be only one or two specimens in existence. Even fine external details, which may not be clearly distinguishable in the natural state, are brought out by a combination of the ultraviolet "clearing" process with the use of the right kind of tissue stain.

The process begins with the fixing of at least the larger specimens in 70 per cent alcohol, to make the tissues firm. This step is frequently not necessary with smaller fish.

Then the specimen is immersed briefly in distilled water, after which it is transferred to a weak solution of potasium hydroxide. Following this, it is stained in a potash solution of alizarin dye, a red color of vegetable origin.

After proper staining, the fish is exposed to ultraviolet radiation, still in the alkali solution, to which glycerine is added, in one or two stages. Finally the specimen, its flesh now glassy-clear and its bones and other denser parts a delicate red, is put into a permanent glass jar, in pure glycerine with a little thymol added to keep molds from growing on it.

Miss Hollister's technic has been gradually developed over a fairly extended period of time. It is especially adapted for the preparation of fish. Some parts of it are based on the Schultze method used by her for Dr. William Beebe and other zoologists with whom she has been associated. Exact details are given in Zoologica (Aug. 30), a scientific journal published by the New York Zoological Society.

Miss Hollister is research associate in the New York Zoological Society's Department of Tropical Research, and a Fellow of the Society. — *Science News Letter*, December 15, 1934.

Smoke Abatement Conference

The National Smoke Abatement Society held its sixth annual meeting in Glasgow, September 28th and 29th, 1934, in conjunction with the Scottish branch of the society. Papers were read by Dr. J. R. Currie, Dr. J. S. Owens, W. J. Grassic, O. Cochran, W. D. Besant, and Dr. J. J. Jervis.

Meeting on Massage and Medical Gymnastics

The annual congress of the Chartered Society of Massage and Medical Gymnastics was held September 24th to 28th, at the Bedford College for Women, London. Special features of the conference were the annual banquet of the society, and a lecture by Sir Humphrey Rolleston.

New Institution for Heliotherapy

The French Ministry of Health and the Interdepartment Office for Social Insurance of the Seine and Seine-et-Oise have constructed a heliotherapeutic sanatorium at Cannes. The chief object of the institution will be the application of the latest methods in actinotherapy to cases of so-called surgical tuberculosis.

The Chemist Now Aids in Solving Crime Mysteries

Traces of lead, benzene and gasoline found in the tissues of two dead men and the amount of salt in the left side of the heart of a body pulled out of the water — these results of chemical analyses enabled police to solve the mysteries of how the victims met their deaths, Dr. Alexander O. Gettler told members of the New York Electrical Society at their annual Science Forum.

Dr. Gettler is toxicologist to New York City, professor of chemistry at Washington Square College, New York University, and professor of toxicology in Bellevue Medical College.

Discovered by chemical tests of the lead, benzene and gasoline in the tissues of two dead men showed that they died accidental victims of their own attempt at arson. Dr. Gettler described the case and the chemist's rôle in its solution as follows:

"Two men were found dead in the cellar of a building. Investigation revealed that they had poured some volatile inflammable liquid over paper and wood intending to light same and put the building on fire. They noticed somebody on the street opposite this building and therefore they waited until this party walked away. While thus waiting, they

inhaled the fumes of the liquid they had poured upon the materials in the cellar. They collapsed and died.

"By chemical analysis we isolated from their brains, lungs and livers some gasoline, some benzene and some lead. The explanation follows. The liquids which they poured upon the materials in the cellar were benzene and ethyl gas. The lead found in their tissues indicated that it was plain ethyl gas rather than ordinary gasoline."

Micro methods for isolating not only lead and benzene but ether, ethyl chloride, ethylene chloride, carbon tetrachloride and similar substances have been devised, Dr. Gettler said. These methods are valuable in detecting the cause of death since many people are killed each year by the inhalation of these anesthetics and cleaning fluids.

Explaining how chemistry can tell the police whether a dead man pulled from the water died by drowning or was killed and afterwards thrown into the water, Dr. Gettler said:

"The circulating blood of all people contains a definite amount of salt. Therefore, the salt content of the blood of the left heart chamber and the right heart chamber is the same. When people drown in salt water, the salt-containing water not only reaches the lungs but circulates as far as the left heart chamber and therefore increases the salt content of the blood therein. The person, however, dies long before the circulation may carry the salt water to the right heart chamber.

"Therefore in all salt water drownings the salt content of the left heart chamber is always much higher than that of the right heart chamber. In normal deaths, not drowning, the salt content of both heart chambers is the same.

"In fresh water drownings water only reaches the left heart chamber and therefore dilutes the salt content. In these fresh water drownings, therefore, the blood of the right heart chamber is always more in salt content than the left heart chamber."

He also described a method of determining alcohol in the human brain. — *Science News Letter*, October 27, 1934.

Health Outlook for 1935 Is Considered Favorable

Nineteen thirty-four has been a good health year. My prediction made a year ago for Science Service has been fulfilled in virtually every particular.

We have had no serious outbreaks of influenza. The deathrate from this disease has been about one-half of what it was in 1933, and, barring an outbreak in the final two weeks of December, we shall have, this year, the lowest influenza mortality rate experienced since 1921. The mortality from tuberculosis has continued to decline; and we in the Metropolitan Life Insurance Company are rejoicing because, this year, for the first time in the history of the millions of our industrial policy-holders of the white race, the tuberculosis deathrate has dropped below 50 per 100,000. Diphtheria has caused fewer deaths than ever before. While there has been a slightly higher mortality this year than last from the other principal infections of childhood, namely, measles, scarlet fever and whooping cough, the deathrate for all have remained low.

It is true that poliomyelitis was unusually prevalent in the late spring and during the summer in the western section of the country, especially in California; but this outbreak was brought under control more speedily than in previous epidemics, and the number of deaths per 100 cases was appreciably lower than has been observed in prior outbreaks of poliomyelitis. The crude rates for heart disease, cancer and diabetes have risen, as we expected they would, because of the advancing average age of the population. We have had more fatal accidents both on the streets and in the factories. This reflects improved economic conditions. More persons are employed this year than last and more are thus subjected to the hazards of industry; motor vehicle traffic, both pleasure and commercial, has increased on our highways, and this automatically has raised the chances of automobile fatalities.

The only important development for which we were not prepared was a sizable increase in the deathrate from penumonia — in spite of the fact that there has been less influenza. This is a most unusual phenomenon, as high deathrates from these diseases ordinarily go together. It is clear that relatively few of the fatal pneumonia cases during 1934 were of influenzal origin. The unusually cold weather of last winter doubtless played an important role, although it is true that even in the warmer months pneumonia mortality has been considerably higher this year than last. Whatever the cause, the increase in deaths from pneumonia is unmistakable.

Taken altogether, however, health conditions have held up very well in 1934 in spite of the fact that there are still millions of unemployed. I would not be surprised to find the final figure, when it becomes possible to calculate the deathrate for the completed year accurately, pretty close to that of 1933, when it was the lowest on record.

The prospects for 1935, in my judgment, are very good. There are no unfavorable signs on the horizon. The new year is not likely to be what we call "an influenza year." Past experience has been that a peak in the mortality from this disease is reached every third year. Inasmuch as the last severe outbreak occurred early in 1933, I hardly expect that we shall be faced with another in 1935. Of course, much is still unknown about the periodicity of epidemics; and weather conditions, always unpredictable, may be an important influence.

Diphtheria, I believe, will continue to fall to lower and lower levels, because the campaign against it has been successful. This has been brought about, for the most part, by immunization against the disease, and interest in immunization continues strong. No single development in the entire public health field has been more widely acclaimed than the reduction — almost to the vanishing point — of the mortality from this former scourge of childhood. The other in-

fectious diseases of childhood are now of comparatively little moment. Scarlet fever, for example, is likely to follow diphtheria into the rank of the utterly preventable diseases.

I believe that tuberculosis will continue to behave according to formula, that is, with every succeeding year we shall observe a reduction in the deathrate. We are nearing the end of the fight against tuberculosis. It is destined in a few years to rank among the minor causes of death — and the greatest reduction in mortality has taken place in the wage-earning population where the situation has always been the gravest. The big desideratum now is to provide bed care for open cases on a larger scale than ever before. There is a very special need for this in depression years when there are many homeless consumptives. Measures to take care of the situation are receiving the attention of health officers and hospital authorities in many communities under the stimulation and financial assistance of the Public Works Administration.

There has been much progress in the field of preventive medicine in 1934. The high reward of the Nobel prize for the work of Drs. Minot, Murphy and Whipple, who developed the liver diet therapy for pernicious anemia, will help to save many lives and to stimulate similar researches into disease of defective glandular function and of metabolic disturbances. The remarkable discoveries of the Nobel prize winners have made physicians more alert in the detection of the disease, which makes for earlier treatment. Much promising work is already being done in the laboratories.

The largest opportunity, however, continues to be in the field of cancer control. Many contributions from skilled experimenters, published this year, indicate that the day is nearer when we may have a method available to discover the beginnings of cancerous growths and be enabled to stop them before much damage is done. It will pay us big dividends to keep such work going — and on a larger scale than ever before.

Altogether, health officers and health workers generally may be more cheerful than they were a year ago. With economic conditions improving, it should prove less difficult for public and private agencies engaged in public health to maintain reasonable budgets and thus to win back the losses of staff and facilities which resulted from the budgetary contractions of the last four years. Already, in 1934, there has been evidence of a slight improvement in the facilities available to health workers. Out of 32 states from which we have had reports, 12 had increases in health budgets in 1934 over 1933; and 42 out of 77 cities showed increased appropriations. With the program of the Federal government developing in the field of public health as one of its major items, it may be possible to make some very forward steps in bringing full-time health services to many rural counties where very limited facilities have until now been available.

I continue to be very optimistic on the outlook for the health of the people in the United States. — *Science News Letter*, December 29, 1934.

Rheumatic Heart Disease Linked With Vitamin C

It is much too soon to advocate oranges, tomatoes and cabbage for those who fear rheumatic heart trouble; but the U. S. Public Health Service reports experiments at the National Institute of Health in which "encouraging results have been obtained" linking the production of rheumatic-like heart lesions with vitamin C deficiency in guinea pigs.

Seizing upon the suggestion of University of California scientists, Drs. James C. Rinehart and Stacy R. Mettier, that a state of undernourishment approaching scurvy may contribute to the development of rheumatic heart disease, Dr. A. M. Stimson of the federal health bureau conducted research which seems to link the two conditions.

With characteristic caution, he says that "it cannot be stated that scurvy is a factor predisposing to rheumatic infection," but adds that the results of his research justify going further in studies of the apparent relation between the two conditions.

Of course, it may be months or years before the discovery can be applied to human beings. Many additional laboratory and field investigations need to be conducted, Dr. Stimson says. Nevertheless he has obtained the following positive and "encouraging" results:

Guinea pigs were given scurvy by withholding vitamin C from their diet. They were then inoculated with hemolytic streptococci, "germs" thought to play a role in causing rheumatic heart disease. The animals developed heart lesions "somewhat comparable" to the most typical lesion of rheumatic disease found in man. Guinea pigs fed on diets lacking other vitamins but not lacking vitamin C did not develop these typical lesions after inoculating with the streptococci.

That is the story so far. When it is finished, vitamin C-containing fruits and vegetables or the vitamin itself, now made in the laboratory, may be able to play a conspicuous part in reducing deaths from heart disease. — *Science News Letter*, December 8, 1934.

Equipment Accepted by Council on Physical Therapy

Recent acceptances by the Council on Physical Therapy of the American Medical Association of equipment of Physical Therapy manufacturers is herewith announced.

Aloe Double Therapy Lamp. — This therapeutic lamp is manufactured by the A. S. Aloe Company of St. Louis. The unit is mounted on a stand and may be conveniently moved about, and the reflector, mounted on a cross arm, is adjustable to any position. The arc is protected by a screen. The unit is called a double therapy carbon arc ultraviolet lamp, because it is possible to make use of the various kinds of carbon, for example, the A Sunshine Carbon, the C therapeutic carbons and the K carbons. The physician may select the carbon that gives the radiation which he desires.

Burdick Nasal-Catheter Oxygen Humidifier. — Manufactured by the Burdick Corporation of Milton, Wis., the purpose of this instrument is to add moisture to oxygen therapy through a nasal catheter. This form of treatment is indicated in cases of pneumonia, pulmonary edema, shock following major surgical procedures, postoperative pneumonic, angina pectoris, asthma, and other conditions in which anoxemia or cyanosis is present. The nasal catheter method of administering oxygen is simple and effective. According to the firm, oxygen consumption of from 5 to 10 liters per minute will maintain an oxygen concentration at the glottis of from 50 to 60 per cent.

Victor Micro-Surgical Diathermy Unit. — This small diathermy, manufactured by the General Electric X-Ray Corporation, Chicago, is intended for surgical use only. It is designed primarily for electric coagulation and electric desiccation but can also be used by certain specialists for straight diathermy to some parts of the body, such as the head, sinuses, ears and eyes, whenever such treatment is indicated.

Hanovia Ultraviolet Meters. — The Hanovia Ultraviolet Meter, marketed by the Hanovia Chemical and Manufacturing Company, Newark, N. J., is designed and calibrated for the measurement of the ultraviolet radiation energy of wavelength 3,310 angstroms and shorter from the quartz mercury arc lamp and from the 60 ampere C carbon arc. The meter consists essentially of a slight sensitive cell mounted behind a filter glass transmitting radiations of wavelengths between 2,500 and 4,000 angstroms and a sensitive microammeter for the measurement of the electric current generated within the cell when the cell is exposed to ultraviolet radiations. The photoelectric cell used is of the dry electronic type and should not be confused with the usual photoelectric cells, which require auxiliary electrical circuits and an electrical supply. The photocell used is manufactured by the Weston Electrical Instrument Company of Newark, N. J.

The McIntosh Electrical Corporation, Chicago, Illinois, manufactures and offers for sale the following infrared radiation equipment:

Biolite Infrared Generator, Senior Model, including three generating units, 900 watt capacity, automatic timer unit, shipping weight 125 pounds.

Biolite Infrared Generator, Junior Model, including Senior Biolite Infrared Generating Unit, 600 watt capacity, shipping weight 40 pounds.

Biolite Infrared Generator, Home Model, including Senior Biolite Infrared Generating Unit, 300 watt capacity, shipping weight 30 pounds.

In general, the construction of the heating element of these three models is common to all. This heating element is made of a lava support or spool, around which is wound the required amount of resistance wire. Finally, the spool and wire are wrapped with monel metal. The finished heating element is about 2 inches long and about 1¼ inches in diameter. The size, however, depends on the rating.

Experiments Compare Value of Radium and X-Rays

New scientific tools for investigating how well radium rays and x-rays act on the human body have just been developed by the National Bureau of Standards.

The apparatus, using blocks of wax instead of the human body to scatter the rays, and a mixture of three fluids having atomic patterns similar to the body tissues to absorb the radiation, may prove useful in helping to decide the old question of when to use and when not to use radium in treating deep-seated cancerous tissue.

Often radium rays work better than x-rays but frequently the opposite is true. Physicians, in the past, have only been able to determine this fact by actual body therapy. Now, it is hoped, a laboratory test can decide the problem in advance of clinical treatment.

Lauriston S. Taylor, of the x-rays standardization section, and Dr. F. L. Mohler, head of the atomic physics section of the Bureau, are the developers of the new ray-measuring equipment.

"While it has been possible," Mr. Taylor said, "to measure separately the ionization of radium and x-rays it has not been possible to compare accurately the results of two such tests and decide definitely when and where each may be most efficiently utilized.

"Any suitable method of measuring these rays must be carried out under conditions which physically are the same as those encountered by the radiation when it enters the body.

"To accomplish this we have constructed apparatus which measures the radiation in liquids instead of gases. These liquids have the same atomic properties as the body tissues." The fluids, he added, are carbon bisulphide, tetrahydronaphthalene and a fluid known as ligroin.

A fine, screen-like mesh of wires properly insulated is immersed in this combination liquid and the ability of the rays to ionize atoms by knocking off electrons is measured.

Below the ionization screen, Mr. Taylor explained, are a series of wax blocks which scatter the rays backward after the fashion of the human body in radiation therapy. These wax blocks are known as "phantom" bodies and take the place of a body in tests. — *Science News Letter*, January 19, 1935.

200-Inch Telescope Disk Successfully Poured

A second 200-inch telescope mirror disk to replace the one cast last March, was poured on December 2 at the Corning Glass Works at Corning, N. Y. The event with its fiery furnaces and ladles of red hot glass was not witnessed by the public during the time of the actual pouring, which was a complete success.

The 200-inch disk when finally completed will be installed in the world's largest telescope to be located on Mt. Palomar, a site only recently selected, in southern California. Final grinding and polishing to an accuracy of a millionth of an inch will be done at the California Institute of Technology. — *Science News Letter*, December 8, 1934.

THE STUDENT'S LIBRARY

ULTRAVIOLET THERAPY IN EYE DISEASE. With a Review of the Action of Other Forms of Radiant Energy. By *Frank W. Law*, M.A., M.D., B.Chir., F.R.C.S., Assistant Surgeon, Central London Ophthalmic Hospital; Ophthalmic Surgeon, Paddington Green Children's Hospital and the West Middlesex Hospital; Pathologist and Curator and Medical Officer in charge of the Physio-Therapeutic Department, The Royal London Ophthalmic Hospital. Foreword by *Sir Stewart Duke-Elder*, M.A., D.Sc., M.D., Ph.D. Boards. Price 5/P. Pp. 78. London: John Murray, 1934.

This is an excellent monograph upon a subject which has heretofore been the ground for fantastic and over-enthusiastic statements. In contrast the author has maintained a severely critical attitude, and has stated that perhaps owing to a hypercritical outlook his results do not reach the high level of excellence attained by other workers. Law believes that more has been claimed for general ultraviolet radiation than is justified by the results. According to his findings, general ultraviolet radiation is of value as an adjuvant in the treatment of local disease of the eye, especially in the chronic inflammatory state, and in diseases of children. Use was made of a mercury quartz lamp for the first nine exposures and then a carbon arc lamp with tungsten cored carbons for another nine exposures. These exposures are given three times a week. This form of therapy is of most value in those diseases which are generally accepted as being an expression of the general condition of the patient, such as debility, or due to under nourishment, or lack of fresh air and sunshine. His results of treatment of interstitial keratitis were better than those of other observers, and, he believes, that other forms of keratitis certainly derive some benefit from general exposures.

For local phototherapy the author uses a mercury vapor lamp as the source of ultraviolet radiation owing to its small emission of infrared rays. The Duke-Elder radiation lamp was used. In spite of the difficulty of producing an experimental cataract by short wave energy and although he has never seen a cataract which could be even remotely connected with ultraviolet therapy, he believes that there is not the slightest justification for carelessness in its application. Local irradiation is stressed as of more value in its own sphere than general. In the treatment of corneal ulcers, except the Mooren's type, superficial keratitis, especially neuroparalytic and phlyctenular, and those of recurrent abrasions and conjunctivitis, he confirms the good opinions expressed by other writers. Healing of corneal lesions is expedited by ultraviolet radiation but its use has no effect upon the density of the subsequent scar. The irradiation of an established nebula has not, in his opinion, the slightest effect upon it. His number of cases of other eye diseases were too small to allow of generalization as to the effects of local phototherapy, but one is encouraged to continue the treatment of cases of sclerosing keratitis, recurrent abrasion, episcleritis, and tuberculosis iritis. The method is of less value than is commonly supposed in cases of recurrent and relapsing keratitis, and useless in keratitis due to the effects of gas. It does not appear to have any considerable bactericidal action upon the conjunctiva.

There is also a discussion of the use and the effects of infrared, x-rays and radium on the eye. The monograph is of great value to those using radiant energy in ophthalmic treatment.

MANIPULATIVE TREATMENT FOR THE MEDICAL PRACTITIONER. By *Thomas Marlin*, M.D. Glasg., M.B., Ch.B., D.P.H., R.C.P.S. (Eng.), D.M.R.E., Medical Officer in Charge of the Massage, Electrotherapeutic, and Light Department, University College Hospital, London. Honorary Physician with Charge of the Physio-therapeutic Department, Hamstead General Hospital, London. Cloth. Price $3.75. New York: Longmans Green & Co., 1934.

Manipulative treatment being a method available to general practitioners, they will find in this book useful hints. The author has acquired a manipulative technic by his own efforts. For a time he attempted their practice with the aid of books alone, but not satisfied with his results, he visited America where he was afforded facilities for his investigations.

Since manipulation is a part of physical therapy, it should be used in conjunction with other physical agents. Treatment by manipulations is chiefly used in four classes of cases (1) reduction of dislocations, (2) forcible breaking down of adhesions, (3) soft tissue manipulations, and (4) manipulation of joints in which no actual dislocation has occurred, but where there is a slight defect of a character difficult to describe.

In soft tissue manipulations it must be appreciated that manipulation is something different from massage, although the dividing line is not very definite. Under soft tissue treatments the author gives several interesting manipulations which he calls inhibitive pressures. These are used in the treatment of headache and hiccough.

In view of the recent publicity about a Canadian physician treating arthritis by foot manipulations, one of the interesting chapters in this book is on foot and ankle manipulations. Attention is called

to the importance of having mobility of all the joints of the foot and the ankle, and their manipulations are described and well illustrated. We agree with the author that this subject has not received full appreciation and cannot be too strongly emphasized. This particular chapter is of interest to everyone treating painful feet.

Manipulation of the other joints of the body are described thoroughly, 86 illustrations greatly aiding the descriptions. Of special interest is his team technic in spinal manipulation. The author believes that the methods commonly used for manipulating the spine whether it be by "the osteopath's twist" or by the forcible movements under an anesthetic, as practiced by orthopedic surgeons, involve an unnecessary amount of force. His team technic demonstrates a movement which can be done with a minimum of force. The last chapter discusses the choice of cases for manipulative treatment.

Certainly some cases are benefited by manipulations. We cannot in all fairness criticize practitioners who perform manipulations until we put them to the test for ourselves. We are only at the beginning of any real knowledge in this field, and many statistical studies are necessary before any definite conclusions can be drawn. This book should be studied by every physical therapist.

THE VISIBLE HEART. A Clinical Study in Cardiovascular Roentgenology in Health and Disease. By *J. Palevski*, M.D., Attending Physician and Cardiologist, Newark Beth Israel Hospital. Cloth. Pp. 207 with 122 illustrations. Price, $5.00. Philadelphia: F. A. Davis Co., 1934.

Any means which suggests a practical and definite contribution promising to raise our therapeutic and diagnostic standards should be critically studied and utilized in medical practice. It needs no argument to point out that this statement is particularly appropriate in connection with our present knowledge of cardiology. Hence this book be it practical or but only pointing out a new approach toward rich possibilities must be regarded as a contribution of great potentiality. It remains for increasing experience and wider application of the principles laid down by the author to raise this study to the sphere of an essential method necessary for complete evaluation of the changing state of the heart as manifested in disease. Undoubtedly the actual visualization of the heart is of interest to every one connected with medical practice, whether cardiologist, surgeon, internist, general practitioner, or roentgenologist. If it is true that neither chemical test nor physical sign can compare with the conclusiveness of the x-ray findings, in peptic ulcer or defective filling in gastric carcinoma, seeing the heart in its kinetic and fixed state by means of fluoroscopic and stereoscopic pictures may be equally plausible toward concise and precise diagnosis. The author points out that "the experienced examiner's eye is immediately attracted by the slightest peculiarity in the cardiac silhouette or by any deviation from the normal activity of any of its parts." This offers a tremendous amount of information, information at times "almost equivalent to dissection *in vivo*." This work must therefore be regarded as a rich source of information of practical import and authoritative content, arranged in literary content into six parts and divided into sixteen chapters. The discussions range from general consideration of extracardiac factors, methods of roentgenologic study of the heart in normal and diseased state, as well as that of the pericardium and the great blood vessels. The publishers are heartily commended for their splendid cooperation by contribution of the clear type, beautiful illustrations on appropriate paper, the totality of which adds to the impressiveness of the entire work. The appended bibliography and the detailed index provide a rich source reference for students to delve in, and are in keeping with the scholarly exposition encountered throughout these pages. This book deserves high praise and widest study.

WHAT SHALL I EAT? By *Edith M. Barber*, B.S., M.S., Food and Nutrition Consultant, Editor of Food Column, *New York Sun;* Lecturer on History of Cookery, Household Arts Department, Teachers College, Columbia University. Cloth. Pp. 107, with illustrations by *Helen E. Hokinson*. Price, $1.75. New York: The Macmillan Company, 1933.

Foods and how to make the most digestable use of them has been a topic that has occupied the best and the worst thinkers throughout the ages. A history of this phase of the subject would be informative and no less amusing, for as much "wishful" thinking has been expended upon the action of foods as upon anything connected with human activity. The book under consideration is a welcome addition to the literature on this threadworn subject, because it not only points out a sane approach but offers some valuable information in a light vein and in a digestable form. The metaphor is truly justifiable under the present circumstances, because "light" and "digestibility" form the very keystone of the author's thesis. Presented in humorous style, sound and serious principles regarding well balanced and nutritious diets are advanced and fads effectively laughed out of court. In the space of 12 chapters there is to be found such interesting topics as How to Keep Happy Though Healthy — The Value of a Sensible Diet in Relation to Beauty and Charm — The Complexion — The Good Disposition — The Figure (girth control) — Prejudices and Fads in Food — Its Cost in Health and Sound Money, etc. The book is charmingly and quaintly illustrated, this adding to its literary and esthetic appeal, an essential and practical condiment for the digestion of the facts therein presented. The work also contains outlined menus, an appendix of charts and tables of food values and costs. In spite of its brevity and lightness of tone it should be stated that it has been written by an authority of national repute and deserves the serious consideration of the medical profession. Indeed, this book could well grace the reception room and even the more serious receptacle of the doctors library for the edification of both patient and practitioner, and with profit to both.

LA RADIOTHÉRAPIE FONCTIONELLE SYMPATHIQUE ET GLANDULAIRE (Functional Radiotherapy of the Sympathicus and of Glands). By *L. Langeron* and *R. Desplats*, Professor of Clinical Medicine and Professor of Electroradiology, respectively, University of Lille. With a preface by *Prof. A. Zimmern*, Member of the Académie de Médicine. Paper. Pp. 152. Price: 25 Francs. Paris: Gaston Doin & Cie, 1934.

All interested in the therapeutic uses of the x-rays other than for their destructive effect on cells, will hail with pleasure this small but highly authoritative exposition of the treatment of the autonomous nervous system and of certain glands by means of "functional" doses of the x-rays for an incredibly large number of baffling affections. The authors have rendered the medical profession a double service. They have organized the widespread articles in the literature in the form of a concise review and, in addition, have given us their personal experiences, favorable and indifferent, in a manner to enable any interested reader to apply the functional method of radiotherapy intelligently.

The book opens with a study of arterial hypertension, arterial obliterations of extremities and proceeds with an analytical study of the trophic and vasomotor disturbances of the extremities, cardiopathies, diseases of the blood, angina pectoris, asthma, pertussis, digestive disturbances, certain forms of nephritis, and hypertrophy of the prostate. The thyroid syndromes and a number of other glandular disturbances are given especial attention, while pruritus, dermatoses, and certain algias are treated briefly yet sufficiently to show the results that have been attained. Calcemia, osseous and articular diseases, stimulation of callus formation in unhealed fractures terminate the clinical part of the book, which is concluded with an analytical review of the therapeutic indications and technics. A generous sized bibliography, an index — so rare in foreign publications, good paper and print add greatly to the value of this timely contribution to a field of medicine which we have every reason to study with profound interest.

It is sincerely hoped that some enterprising American publisher will undertake a translation of this book, because it should be made accessible to all who are not fortunate enough to master medical French.

A PRACTICAL MEDICAL DICTIONARY. By *Thomas Lathrop Stedman*, A.M., M.D., Editor of the "Twentieth Century Practice of Medicine," of the "Reference Handbook of the Medical Sciences," and of "The Nurse's Medical Lexicon." Formerly Editor of the "Medical Record." Twelfth, Revised Edition. Supplemented by New British Anatomical Nomenclature. Illustrated. Price Indexed, $7.50; Plain Edge, $7.00. Pp. 1265. Baltimore: William Wood & Company, 1934.

"The present edition of "A Practical Medical Dictionary" contains a thousand new titles, without counting several hundred new subtitles; that is to say, the prolific medical jargon has grown by an average of more than one new word a day during the past three years. In this revision are noted all the changes in the British Pharmacopeia of 1932, and it is interesting to observe that the two Pharmacopeias, British and United States, are growing closer together in both titles and strengths of the official preparations." The need for an authentic dictionary of medical terms is too well appreciated by every worker in medical circles. There is hardly a day when writers, reference workers, students and practitioners, do not find many occasions to seek definition, spelling derivation and expansion of the various medical words and phrases. A work as comprehensive and up-to-date as this serves a most useful purpose, containing as it does a library of information. It is extremely difficult to evaluate the tremendous effort put into this volume. And it is more difficult to understand how any one who is at all interested in the literary or practical side of medicine and its allied sciences can fail to have this volume constantly within his reach.

THE 1934 YEAR BOOK OF GENERAL SURGERY. Edited by *Evarts A. Graham*, A.B., M.D., Professor of Surgery, Washington University School of Medicine. Cloth. Pp. 815. Price, $3.00. Chicago: The Year Book Publishers, Inc., 1934.

This 1934 review of the literature of general and orthopedic surgery is replete with interesting contributions abstracted from the medical journals of the world. The abstracts contain sufficient data to present the concerned articles virtually *in toto*. One notes frequent critical comments by the editor, all of which are instructive. More than 140 illustrations have been faithfully reproduced from originals.

The subject matter considered embraces not only the domain of surgical diseases but special features, such as anesthesia, asepsis, wound healing, thrombosis, embolism, infections, and the like. Electrosurgery is proportionately well represented. In the customary short introduction Graham points out the paths of research that have been especially selected during the year just concluded, e. g., thoracic surgery, limitation of postoperative drainage of the peritoneal cavity in acute infections, treatment of burns, and electrosurgery. The editor wisely adheres to the stand that contrary to the present trend acute cholecystitis should not be operated on until abatement of the inflammation.

A good index enhances the value of the book as one for reference. The title printed on the outside cover back has been changed by the publishers to a more attractive style. All in all this annual is even better than its predecessors.

INTERNATIONAL ABSTRACTS

Diathermy and Regeneration of Bone. E. David Weinberg, and Grant E. Ward.

Arch. Surg. **28**:1121 (June) 1934.

Experiments were conducted for the purpose of determining: (1) whether there is an actual rise in temperature in bone when an extremity of an experimental animal is submitted to treatments with diathermy; (2) if there is a rise in the temperature of bone, whether this results in any demonstrable physiologic effect on bone in normal laboratory animals; (3) whether this physiologic effect, if present, hastens repair processes following injury to the bone.

During the immediate postoperative treatment with diathermy attention was attracted by variations in bleeding from the open wound. This was carefully checked and found to be due to the treatment. Shortly after turning on of the current there was a free flow of blood, but as soon as the heat was discontinued and the leg allowed to cool a little, the bleeding stopped. This occurred with such regularity that the conclusion was formed that the heat or some other effect of diathermy dilated the blood vessels, allowing free escape of blood into the wound. The increased formation of new bone following diathermy was assumed to be due to the increased circulation.

The rise in temperature of the muscles and that of the bones was nearly parallel. The temperature of the muscles rose a little faster at first, to be overtaken later by the temperature of the bones, which, near the end of the experiment, again fell. The main object of the investigation was to secure an actual rise in temperature in the bone, which could be reproduced at will by repeating the exact application of current determined at the time of the operation, and gave the rise in temperature in the bone above the normal and yet within physiologic limits. That this was obtained and gave definite benefical results is verified by the results of the postmortem examinations.

In three weeks the treated leg showed a decided advance in the periosteal and endosteal formation of new bone. The cut edges of the endosteum were lined with osteoblasts. There was a marked proliferation of bone in the medullary cavity, so that it was almost completely filled.

There is no periosteal new-bone formation, and only a slight amount of endosteal new bone in the control leg. The medullary cavity was far from being completely filled with bone. Along the site of the hole made by the drill the cavity was filled with a partially organized blood clot and some bone dust. Other portions of the marrow appeared to be normal, so that the osteogenesis was local.

In four weeks the treated leg revealed marked new periosteal bone. The hole was completely filled with a compact type of bone (not the young lamellar type) and looked like old cortical bone, except for an increase in haversian canals, which were more vascular and contained a larger number of young fibroblasts than usual.

In the control leg there was little or no periosteal new bone, and the hole was filled with a lamellar type of bone, so that it was not yet healed.

Contribution to the Symptomatology and Therapy of Pleural Diseases. (Beitraege zur Symptomatologie und Therapie Pleuraler Erkrankungen). Hermann Schultze.

Wein. klin. Wchnschr. **47**:1198, 1934.

In some cases the author was very successful with use of short wave therapy. The resorption of the accumulated liquid seemed to proceed faster, and the intensity of the inflammatory symptoms seemed to abate more rapidly. After recovery had taken place only a slight induration remained which apparently was well prepared for further adequate treatment. However, the number of pleural diseases being treated with ultra short waves is still too small to draw a definite conclusion.

Actual Questions About Short Wave Therapy. (Aktuelle Fragen der Kurzwellentherapie). Georg Schweitzer.

Med. Welt. **8**:158, 1934.

The maximum therapeutic usefulness of short waves is located within the range of radiation from 10-15 meters. Inflammations form the chief indication for its employment. Short waves bring about a constant active hyperaemia of the treated tissues. Successful results depend upon vasodilating effects and hence will not influence sclerotic vessels or those showing injuries of innervation. If pain results from spasms in the striated muscles, short waves would act as a regulator of the organs of the vegetative system. Neuralgia of different regions was successfully treated. Fatigue of toxic and natural origin was successfully treated and hence may well be indicated in certain forms of insomnia. Pain due to herpes zoster improved considerably.

Serious trigeminal neuralgia (tic-douloureux) was found to be refractory to short wave therapy, as also paresis, when both are of rheumatic origin. For postoperative adhesion and cicatricial affections, short wave therapy is indicated, muscular pain and lumbago would react only in sporadic cases and to a small extent. In arthritis deformans the symptom of pains will be improved or altogether alleviated. Traumatic types of arth-

ritis will react in the same favorable manner. subacute and chronic multiple arthritis react prove successfully and tendovaginitis will also do so rapidly. When applied to pleural effusion of non tuberculous origin the treatment resulted in resorption, that is to say, in relief of pains. Inflammatory processes of the abdominal cavity, one of the testicle, one of the adnexia were crowned with success. Schweitzer administered the short wave therapy in six cases of different diseases.

Short wave therapy is indicated for neuralgia and neurosis, particularly for sciatic affections, for superficial purulent inflammation of the skin and its appendages (hydroadenosis), and for different types of arthritis.

Influence on the Angio-Trophoneurotic Symptoms by Short Waves. (Beeinflussbarkeit der Angio-Trophoneurotischen Symptome durch Kurzwellen.) Eugen Weissenberg.

Wien. klin. Wchnschr. 47:302, 1934.

Due to Pflomm's research of short waves their use was demonstrated to have an influence on the visceral nervous system which proved its pressor action on the sympaticotonus and depressor action on the vagotonus. The author re-examined the effects of adrenalin, pilocarpin and atropin while administering short wave radiation. The results were sometimes in accord and other times at variance with Pflomm's findings, which the author attributes to a difference in the sensibility of the individuals and to technical defects. The positive results of the author's investigations were nevertheless sufficient to justify study of the effect of the short waves on disturbances of the visceral nervous system. It was seen that pain became more acute after applying short waves of great intensity, while distinct relief was obtained when waves of inferior strength were used. Patients with acroparesthesia and Raynaud's disease were symptomatically relieved under the treatment. On the other hand some patients with endoarteritis obliterans and serious types of gangrene reacted by increased pain during the radiation. In spastic conditions of the capillary vessels at the extremities favorable results were most evident in winter, enabling the patients to stay outdoors longer than before, until the angio-spastic symptoms reappeared. Ultimately these symptoms disappeared entirely, and the abscesses were healed. In addition to the diseased extremities sometimes the controlling sympathetic nerve (funiculus marginalis) was subject to treatment. Patients with endoarteritis obliterans and those with gangrene required treatment of long duration. However, it should not be omitted that some of the attempts have proven failures. In a large percentage of angio-spastic conditions of some other types, e. g., migraine, angina pectoris, dysmenorrhea, asthma, the short waves caused the disturbances to disappear within a short time. Generally speaking the short wave treatment of angiotrophoneurotic symptoms is very promising.

Ultraviolet Light as a Method of Treating Erysipelas. Norman Edwin Titus.

Med. Rec. 140:259 (Sept. 5) 1934.

The author's studies led him to the following conclusions. The action of ultraviolet light *in vivo* is not germicidal, the effects being due to a chemical reaction brought about in the skin upon certain protein substances, either an effect upon the nucleoprotein of the bacteria themselves or a change in the chemical composition of the tissues, so that there is an increased resistance to the sensitizing action of the bacteria. Inasmuch as the intense dosage used creates a true edema of the skin, even to the extent of formation of blebs, it is reasonable to consider that this transudate of serum may be affected in a way to form an autoantitoxin.

Another effect of the purposely induced severe ultraviolet burn, is the formation of a prolonged erythema, which in itself causes marked irritation of the skin, increase in skin temperature, and a local superactivation of leucocytes. Inasmuch as no pus is formed in these cases, it is not to be expected that the increased leucocytosis has any direct effect upon the infection while the increased temperature does cause an increase in the number of leucocytes in the tissues.

The author uses a lamp giving an erythema in one minute at thirty inches. This is used at fifteen inches, thereby quadrupling the intensity, and from four to five minutes are given, depending upon whether the skin is on a tender portion of the body or one that is used to rough treatment, such as the face.

In sixteen cases of facial erysipelas a return to normal temperature took place in less than one day and were removed from precautions in forty-eight hours.

First Experiences With Ultra Short Wave Therapy in Children. (Erste Erfahrungen mit der Ultrakurzwellentherapie im Kindesalter). Hella Hoeffler.

Jahrbuch f. Kinderklkde 5:291, 1934.

Method: Siemen's tubular apparatus; four m. length wave at the beginning and six m. wave in the later course by a constant filament current of 14.19 voltage, beginning with three-five minutes and prolonged to 15 minutes. Schliephake's electrodes were not adjacent but kept at a variable distance and fixed by two wooden frames (without any metallic portions) with three parts rotating on different planes.

Indications: All inflammatory cutaneous processes tending to form abscesses, cutaneous infiltrations, and cutaneous abscesses, purulent omphalitis, mastitis, parotitis, lymphadenitis, and abscesses of the sweat glands. In the latter the author on several occasions noticed large cutaneous bags after spontaneous perforation. For a long time a tampon had to be applied to them and regression went on very slowly. For this reason, if fluctuation is present the author is now making a puncture incision, after which the author is continuing the radiation.

As in nearly all of the cases the treatment was considerably shortened by the use of ultra

short waves, early relief of pains and consequently improvement of the general conditions was attained. In phlegmonous processes the results were extremely good, producing rapid demarcation and softening. The same observation was made in multiple cutaneous abscesses in infants with chronic disturbances of nutrition (atrophy). In the treatment of retronasal angina favorable effects may be expected.

The Measurement of Ultraviolet Light.

Brit. J. Radiol. 7:119 (Feb.) 1934.

The International Committee on the Measurement of Ultraviolet Light met in 1932 and decided that the time was not yet ripe for setting up a physical unit of intensity for ultraviolet light or for specifying a standard course.

The committee recommended that steps be taken to "standardize" physically the several sources of ultraviolet radiation used in medicine. For the purpose, the ultraviolet spectrum shall be divided into three regions (long wave, medium wave, and short wave) realized experimentally by the differential use of the following filters suggested by Dr. Coblentz:

1. Noviol A for long wavelengths. A barium flint made by the Bureau of Standards, opaque to radiation shorter than 3150 A and giving approximately the region 4000-3150 A.

2. Barium flint for medium wavelengths. A pyrex glass made by the Corning Glass Co., and opaque to radiation shorter than 2800 A giving approximately the region 3150-2800 A.

3. Pyrex for short wavelengths, giving approximately the rays shorter than 2800 A.

The committee further recommend to medical practitioners the use of some simple indicator (biological, photochemical, or photoelectrical) as a check on the constancy of each lamp used during treatment.

Definite adoption of a unit of measurement of intensity of untraviolet light used in medicine cannot now be recommended at the present congress. In view of the complexity of the biological and other problems which must be solved before a unit can be fixed.

Sensitizing and Desensitizing Experiments in Combination with Radium Treatment. L. Freund.

Fortschr. a. d. Geb. d. Röntgenstr. **48**:229, 1933.

Identical radium exposures of normal skin and a skin area injected with adrenalin caused an accelerated and intensified erythema for the adrenalin-treated skin within the first 14 days. The second erythema, starting on the 19th day was decidedly weaker for the adrenalised skin than for the normal skin. Several explanations of this "inversion phenomenon" are tried.

The Effects of X-rays Upon the Blood Catalase. L. Deutsch.

Str. Ther. **48**:114, 1933.

The catalase enzyme of the blood is increased after x-ray treatment. This increase is sometimes relative (to the number of red blood corpuscles), in most cases however it is an absolute increase. The result depends upon dosage, area treated, and volume of exposed tissue.

Experimental Modification of Infection and of Carriers by X-rays. J. V. Khreninger-Guggenberger.

Str. Ther. **48**:103, 1933.

The author has noticed an increased disposition of radiologists and x-ray technicians toward infections. For the study of this problem white mice were exposed, part to 300 r in 45 minutes, part to 400 r in 4 days. The irradiated animals exhibited a greatly increased death rate due to infections in comparison to the controls. Irradiated carriers of tetragenus cocci showed a higher death rate and a greater rate of infection than the non-irradiated animals.

Investigations About the Reaction of the Rabbit Skin to X-rays. 4th Communication. F. Ellinger.

Str. Ther. **48**:97, 1933.

Previous observations had indicated accelerated skin reactions to x-ray exposures after thyroxin application and at times of increased activity of the thyroid gland. Now it is observed that thyroidectomy causes retardation of the skin reactions.

The Use of Diathermy in the Treatment of the Nasal Accessory Sinuses. Jay N. Fishbein.

Arch. Otolaryng. **18**:199 (Aug.) 1933.

The purpose of diathermy in the treatment of infections of the sinuses is to increase the efficacy of the Dowling tampons and to decrease the time of treatment. It is particularly effective in the treatment of infections of the ethmoid sinuses. The colloidal silver employed is a 15 per cent solution of mild silver protein. The colloidal solution passes through the membrane without ill effects and is capable of destroying bacterial life without injury to the tissues of the host. This action is greatly enhanced by the use of diathermy, and the time decreased to about 15 or 20 minutes. The solution is distributed by the circulation beyond the area of its application.

The active electrodes are made of light tape consisting of long continuous strands of fine metal, closely woven together. A piece of long fiber cotton is laid in the flat of the hand, and rolled about the tape by means of a smooth applicator. (It is essential that the cotton covers the ribbon completely to avoid an unpleasant prickling sensation in the nose.) The tampon is saturated with the solution of silver protein and inserted into the middle meatus as far back as

possible in the direction of the sphenoid sinus, following which the applicator is withdrawn. Preceding this, a smaller tampon is inserted high into the olfactory fissure.

The dispersive electrode is placed on the forehead. It is simpler and more advantageous to adjust it here than on the back of the neck, as the distance is less and the resistance is correspondingly reduced.

Following the treatment there is a discharge of mucus from the membrane, and the result is a considerable depletion of the turgid tissue. Many conditions within the nose yield to this type of treatment. Acute and chronic infections of the nasal accessory sinuses are benefited, both by the direct germicidal effects of the silver salt and by the improved drainage of the upper air passages resulting from the reduction in swelling.

The Electrical Resistance of Stimulated Muscle. W. Hartree.

J. Physiol. **79**:487 (Oct. 25) 1933.

The author summarizes his studies of electrical resistance of stimulated muscles as follows: When the movement of a muscle past the electrode is prevented, its electrical resistance to a current of 100,000 cycles per second is not measurably affected by stimulation. The physicochemical changes, therefore, during contraction are not such as to produce a measurable increase in the number of ions free in the muscle fluid, or in their mobility.

Ions and Their Biological Application. B. Rajewsky.

Str. Ther. **48**:125, 1933.

The author describes the pioneer work of Dessauer and his coworkers concerning the study of atmospheric ions, the technical production, dosage and application of therapeutically useful ions. The biological effects were tried on healthy persons and on patients. While positive ions caused unfavorable results, the application of negative ions proved valuable for the treatment of many diseases, the most marked results being obtained in cases of hypertension, sinusitis, asthmatic conditions, migraine and exhaustion.

The Short Distance X-ray Treatment of Malignant Tumors. H. Chaoul and A. Adam.

Str. Ther. **48**:31, 1933.

The effect of x-ray wavelength upon the therapeutic results is well understood at the present time. The time factor has been well studied recently. It seems that fractioning plays a decidedly larger rôle than protraction. Now the problem of space distribution of dosage comes up again. The authors develop a short distance technic, which permits application of extreme doses (e.g. 8,000 r in 3 weeks; about 15,000 in 3 months) to a limited area. Good results without skin damage within 25 months were obtained on skin tumors and glandular metastasies.

Studies of Deep Heat Penetration in the Human Body by Means of Short Wave Therapy. (Untersuchungen uber Trefenwarmung des menschlichen organisms in Kurzwellenfeld.) F. Schultze-Rhowhof and W. Rehr.

Arch. f. Gynäk. **157**:468, 1934.

The authors used a six with a 30 m. wave Universalradiotherm., and measured the heat in the tissues by means of isolated quick silver in a wine spirits thermometer the behavior of which in a condensation field has been tested. In all cases a dorso ventral field was used, namely one electrode over the symphysis and the other in the gluteal region. The treatment with 30 m. lasted 15 to 20 minutes. The temperature in the bladder was hardly affected when before and after temperatures were compared. Likewise, the temperature was hardly affected in the vaginal or rectal thermometers. Nevertheless, the patients state that during the treatment they feel much warmer and their skin feels warmer. There is no visible increase in temperature in the deep pelvic cavities due to a warmth regulatory mechanism. The dynamics of the short wave is not directly comparable with an externally applied heat stimulus. There was however, some warming of the circulating blood since the expired air during the treatment increases by five degrees C. It is suggested that the action of this electrical field may possibly be an electro-chemical effect on tissue rather than thermo-electric.

Diathermy: Surgical and Medical in Otolaryngology. Lee M. Hurd.

The Laryngoscope **43**:730 (Sept.) 1933.

It has become evident that with the improvement in the high frequency apparatus, diathermy has a definite place in otolaryngology. The early machines produced some faradic current, which caused violent contractions of the muscles, and sharp pain in the adjacent sensory nerves. The manufacturers of the better types of apparatus have largely overcome this drawback.

For anesthesia the author uses alypin, 10 to 30 per cent, plus a small quantity of adrenalin in the nose, and a solution of equal parts of alypin, analin oil and alcohol in the throat. For tonsil remnants, a small brush of cotton on an applicator moistened with two or three drops of the solution, is wiped on the area three times at intervals of from five to 10 minutes, and this usually produces a good anesthesia. Novocain by hypodermic works well, if you allow time for the edema to subside; if not, the radiating heat may boil the novocain and cause greater destruction than is intended. General anesthesia is necessary in the nasopharynx, usually with adults, always with children. For such time as the diathermy is in use ether is dangerous and chloroform may be substituted. The danger is that the mixture of ether and air may be exploded by an electric spark from either the transformer, the exposed spark gap, or about the electrode point itself.

The insulated snare can be used for removal of nasal mucosal hypertrophies, tonsillar tissue,

and similar types without hemorrhage. The snare cannula is insulated, and fine steel piano wire is used, from No. one to No. three, since the ordinary No. five wire requires too much current.

Coagulation removes postoperative nasal granulations. Granulations with greater efficiency and comfort to the patient, and there is no bloody discharge afterward. Mucosal hypertrophies of the inferior turbinate are reduced with the double needle electrode. Coagulation can also be applied for nasal synechiae for tonsil and adenoid remnants, and pharyngeal lymphoid follicles, leukoplakia, and for the removal of faucial tonsils. Electrocoagulation does not and should not take the place of good surgery. It has a place, however, in competent hands, i.e., for poor surgical risks, such as patients who are elderly, patients with diabetes, or arteriosclerosis with advanced kidney and heart lesions.

Carcinoma of the Lip. Bernard P. Widman.

Am. J. Roent. & Rad. Therap., Aug., 1934.

Widman analyzes the results of the radiation treatment of 168 cases of cancer of the lip. Of 125 patients without node enlargement at the beginning of treatment, 78, or 62 per cent, are symptom-free one to 10 years or more. These results are based on all cases without respect to size. For lesions about one centimeter in diameter the curability range is greater than 90 per cent. With prophylactic irradiation of the lymph nodes of the neck subsequent development of cervical node metastases occurred in 17 per cent of 52 cases, as against 51 per cent of 72 cases that developed uncontrollable cervical node metastases without prophylactic irradiation. There is evidence to indicate that the best results are obtained in small lesions, one centimeter in diameter or less, and with adequate treatment of lesions of short duration. — Abst. M. J. Australia **2**:621 (Nov. 10) 1934.

The Minimal Electrical Stimulus in Exophthalmic Goiter. D. W. C. Northfield.

Guy's Hospital Reports, Jan., 1934.

Northfield reaffirms the fact that the incidence of tetany as a post-operative complication of primary Graves' disease is extremely variable and varies in different clinics from one to 2,000 to as much as three per cent or four per cent. An attempt has been made to determine the electrical excitability of patients before they develop frank tetany. The test is used by means of a galvanic current. The same muscle (*brachio-radialis*) is chosen for all tests and the conditions of temperature and moisture of the skin which affect the contact of the electrodes are constant. The weakest current which will evoke a muscular contraction is then estimated. During the years 1929 to 1931 this test was performed in 41 cases. The extremes of current necessary to cause contraction were from 0.4 to 4.0 milliampères. Only one patient developed tetany following operation. In this patient the pre-operative stimulus was 0.6 milliampere and the tetany was successfully treated by parathormone and calcium. At subsequent dates the test was 2.7 milliampères, and finally 3.0 milliampères. In conclusion the author summarizes as follows: In exophthalmic goiter there is a marked diminution in the minimal electrical threshold stimulus of peripheral nerves. This diminished threshold for electrical stimulation is much improved by operation. In a young patient with a rapid history a low figure is to be expected and is an indication in some measure of the severity of the disease. A low post-operative figure is some indication that further treatment may yet be necessary. When the disease has existed for a long time before relief is sought, this figure will probably remain less than normal. A markedly low threshold (in region of 0.6 milliampere) is evidence of latent tetany and may lead to post-operative frank tetany. Hyperpnœa and pyrexia are considered to be the chief primary factors in producing latent tetany. Therefore the alleviation of the former by complete rest and of the latter by adequate methods of cooling are the best means of preventing the post-operative tetany. — Abst. M. J. Australia **2**:621 (Nov. 10) 1934.

The Short Waves in Biology and Medicine. (Les ondes courtes en biologie et en médecine.) H. Dausset and A. Dognon.

Paris méd. **91**:99 (Feb.) 1934.

In small dosage with hardly any noticeable heating effect the short waves bring about an acceleration in the development of some bird's eggs, in the growth of young mice and Guinea pigs, and in the development of seeds of some plants. Growth of bacteria reacts to short wave condenser field in an individual manner. Koch-bacilli have been destroyed by a wave length of 4.8 m. streptococci by 3.5 m. Effects of short waves on the tissue were demonstrated in the first instance by a developing hyperemia. In animal experimentation, testicles displayed extensive resistance with regard to spermatogenesis after short wave irradiation. Red blood corpuscles presented various reactions, leucocytes although reduced at the very outset were afterwards considerably increased. There was always a rise in the ability of blood coagulation. After short wave irradiation, the growth of experimental tumors was readily stopped. The main effect of short waves is based on heating of the body. The indications for short wave therapy are completely alike to that of diathermy unless counter evidence is furnished; however, there are a number of diseases which hardly qualify for ordinary diathermy treatment, but are well indicated for short wave therapy. Above all we should point towards possibilities of general irradiation or, so to speak, short wave plunge baths. In this respect it is worth while mentioning its value in progressive paralysis, also of some types of adipositas due to an endocrin-genital basis, in vascular and spasmodic conditions, in asthma, and mostly in hemiplegia.